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# RESEARCH MEMORANDUM

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ALTITUDE PERFORMANCE AND OPERATIONAL CHARACTERISTICS

OF YJ71-A-7 TURBOJET ENGINE

By Ivan D. Smith, Charles V. Leonard, Jr., and Harry E. Bloomer

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RESEARCH MEMORANDUM

ALTITUDE PERFORMANCE AND OPERATIONAL CHARACTERISTICS

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## SUMMARY

Altitude performance of a YJ71-A-7 turbojet engine, with afterburner inoperative, was determined in the NACA Lewis altitude wind tunnel over a wide range of flight conditions. Engine speed and exhaust-nozzle area were controlled independently during this investigation.

The variation of corrected values of air flow, net thrust, and fuel flow with corrected engine speed was not defined by a single curve with changes in altitude at given flight Mach number. Changes in altitude had very little effect on minimum specific fuel consumption at altitudes up to 45,000 feet. There is one exhaust-nozzle schedule that is nearly optimum for all flight conditions. Performance calculated from pumping characteristics agreed with experimental values and can therefore be used to extend engine performance data.

## INTRODUCTION

An investigation was conducted in the NACA Lewis altitude wind tunnel to evaluate the over-all performance characteristics of a YJ71-A-7 turbojet engine over a range of engine speeds and exhaust-nozzle areas at altitudes from 6000 to 55,000 feet and flight Mach numbers from 0.16 to 1.00. Performance data were obtained with afterburner inoperative and are restricted to the engine speed range obtainable with the acceleration air bleed ports closed.

The data are presented in several forms to facilitate interpretation of the results. The variations of corrected values of air flow, net thrust, and fuel flow with corrected engine speed are shown for several flight conditions. Engine performance maps showing the relation between exhaust-gas temperature, engine speed, net thrust, exhaust-nozzle area, and specific fuel consumption are also presented for several flight conditions. The effects of two methods of thrust modulation on specific fuel consumption are compared over a range of altitudes and flight Mach numbers. Engine pumping characteristics are also presented so that the

engine pressure ratio, air flow, and fuel flow can be predicted, and over-all engine performance therefore calculated for flight conditions other than those investigated. Variation of net thrust and fuel flow with true airspeed is presented for a range of altitudes including a comparison and extension of the actual data with performance calculated from pumping characteristics. A method for determining jet thrust in flight from exhaust-nozzle pressure drop is discussed. All engine performance data obtained during the investigation are tabulated herein.

Although a specific investigation of engine operational characteristics was not made, some operational problems were encountered in the course of engine operation and are discussed briefly.

## APPARATUS AND PROCEDURE

### Engine

The manufacturer's static sea-level rating of the YJ71-A-7 engine, with afterburner inoperative, is 9515 pounds of thrust with a specific fuel consumption of 0.989 pound per hour per pound of thrust, an air flow of 158 pounds per second, and a compressor pressure ratio of about 8.9 to 1 at an engine speed of 6100 rpm and a turbine-outlet temperature of $1685^\circ$ R. The length of the engine with afterburner is 238 inches, the maximum height is $46\frac{1}{4}$ inches, and the maximum width is $39\frac{3}{4}$ inches. The dry weight of engine and accessories is about 4600 pounds. The engine components included a 16-stage axial-flow compressor, a cannular-type combustor with 10 circular inner liners, a three-stage turbine, an afterburner, and a variable-area iris-type exhaust nozzle.

In order to permit acceleration in the engine speed range from 65 to 85 percent of rated speed, at which the compressor operating line approaches the surge line (ref. 1), air is bled from eight bleed ports in the combustor inlet section. These bleed ports operate automatically and are scheduled to be open between 55 and 92 percent of rated engine speed.

### Installation

The engine and afterburner were mounted on a wing section that spanned the 20-foot-diameter test section of the altitude wind tunnel (fig. 1). Dry air was supplied to the engine from the tunnel make-up air system through a duct connected to the engine inlet. Throttle valves installed in the duct permitted regulation of the pressure at the inlet of the engine. Engine thrust and drag measurements by the tunnel balance scales were made possible by a frictionless slip joint located in the duct upstream of the engine.

Instrumentation for measuring pressure and temperature was installed at various stations in the engine (fig. 2). Thermocouples for measuring engine-inlet temperature were located upstream of the engine in the inlet duct. The temperatures measured at the exhaust-nozzle inlet (station 6) were used as the turbine-outlet temperatures (station 4) to avoid possible effects of radiation on the temperatures measured at station 4.

Procedure

Engine performance data presented in this report were obtained at the flight conditions shown in the following table:

| Altitude, ft | Flight Mach number | | | |
| --- | --- | --- | --- | --- |
| | 0.16 | 0.64 | 0.82 | 1.00 |
| 6,000 | X | | | |
| 15,000 | X | | | |
| 25,000 | X | X | | |
| 35,000 | X | X | | X |
| 45,000 | X | X | | |
| 55,000 | X | | X | |

Engine performance data were obtained at engine speeds from 86 to 102 percent of rated speed at most flight conditions. The schedule of the bleed ports in the combustor inlet section was interrupted so that the ports would remain closed for all steady-state data presented in this report regardless of engine speed. The surge characteristic of the compressor did not allow steady-state operation at engine speeds below 86 percent of rated with the bleed ports closed. Data were obtained at five fixed settings of the variable-area exhaust nozzle having projected areas of 2.54, 2.685, 2.86, 3.18, and 4.13 square feet.

In order to simulate the various flight conditions, the air flow through the make-up air duct was throttled from approximately sea-level pressure to a total pressure at the engine inlet corresponding to the desired flight condition with complete ram pressure recovery assumed. The static pressure in the tunnel test section, into which the engine exhausted, was set at the desired altitude ambient pressure. The temperature of the inlet air approximated NACA standard values wherever possible with the exception that the minimum temperature obtainable was about $440^{\circ}$ R.

Tunnel balance scale thrust values were used for all engine performance data in this report.

The engine fuel used was MIL-F-5624A grade JP-4 having a low heating value of 18,700 Btu per pound and a hydrogen-carbon ratio of 0.171.

The symbols and the methods of calculation used herein are given in appendixes A and B, respectively.


## RESULTS AND DISCUSSION

All engine performance data obtained during the investigation are compiled in table I. Inasmuch as engine-inlet air temperatures below $440°$ R were not obtained and because small errors occurred in tunnel static-pressure settings, the data presented graphically in nongeneralized form have been adjusted to NACA standard altitude conditions by use of the factors $\delta_a$ and $\theta_a$ (see appendix A).


### Generalized Performance

The variation of corrected air flow with corrected engine speed at an exhaust-nozzle area of 2.685 square feet is shown in figure 3 for a range of altitudes and flight Mach numbers. This exhaust-nozzle area is slightly larger than the area required for rated static sea-level performance and slightly smaller than the area for minimum specific fuel consumption. Air flow increased with engine speed up to a speed of about 6400 rpm, after which it was not increased appreciably by a further increase in speed. The corrected air flow at rated corrected engine speed was 167 pounds per second at altitudes below 15,000 feet and decreased to about 163 pounds per second at an altitude of 45,000 feet. This decrease in corrected air flow was primarily due to Reynolds number effects.

The variation of corrected net thrust and fuel flow with corrected engine speed at an exhaust-nozzle area of 2.685 square feet is shown in figures 4 and 5, respectively, for a range of altitudes at a flight Mach number of 0.16. Corrected net thrust and fuel flow increase with engine speed throughout the entire range although corrected fuel flow increased at a greater rate than corrected net thrust at high corrected engine speeds. The increase in corrected net thrust with altitude is associated with reductions in compressor and turbine efficiencies in that a higher corrected turbine-inlet temperature (and therefore pressure) was required to maintain a given corrected engine speed. The elevation of corrected temperature and pressure levels within the engine overcompensated for the reduction in air flow which accompanied the increase in altitude (fig. 3) so that there was a resultant increase in net thrust.

The increase in corrected fuel flow with altitude is associated with reductions in compressor, combustor, and turbine efficiencies.

## Performance Maps

Performance maps showing the relation between exhaust-gas temperature, engine speed, net thrust, exhaust-nozzle area, and specific fuel consumption are presented in figure 6 for all flight conditions at which a sufficient range of engine variables was covered. These maps were obtained by cross plotting from curves showing the variation of turbine-outlet temperature, net thrust, and specific fuel consumption with engine speed at the five exhaust-nozzle areas for the various flight conditions. Lines were faired through the average of data points and are within an accuracy of ±3 percent.

For the range of flight conditions investigated, minimum specific fuel consumption occurred at engine speeds between approximately 5100 and 5800 rpm and at exhaust-nozzle areas of 2.86 square feet or less. These engine speeds at which minimum specific fuel consumption occurred correspond to a corrected engine speed of approximately 5600 rpm (92 percent of rated engine speed). As corrected engine speed increased beyond 5600 rpm, the specific fuel consumption increased principally because of a reduction in compressor efficiency. As the exhaust-nozzle area was increased beyond 2.86 square feet, the specific fuel consumption increased principally because of a large increase in tail-pipe pressure loss and a decrease in ideal air-cycle efficiency.

Altitude had very little effect on minimum specific fuel consumption. For example, at a flight Mach number of 0.16 and altitude from 15,000 to 45,000 feet, the minimum specific fuel consumption varied between 0.925 and 0.950 pound per hour per pound net thrust (less than 3 percent). The variation in minimum specific fuel consumption was small because the compressor pressure ratio, and consequently the ideal air-cycle efficiency, increased with altitude and therefore compensated for the attendant reduction in component efficiencies.

An increase in flight Mach number at any altitude caused an appreciable increase in minimum specific fuel consumption. At 35,000 feet, the minimum specific fuel consumption increased from 0.925 to 1.20 pounds per hour per pound net thrust as flight Mach number was increased from 0.16 to 1.00.

On each map is shown an optimum exhaust-nozzle schedule, which is the schedule that provides the best specific fuel consumption for each thrust level. In areas in which the specific fuel consumption was approximately constant over a range of thrust levels, the exhaust-nozzle area is scheduled to be as large as possible to give a greater acceleration margin below the compressor surge limit. This optimum exhaust-

nozzle schedule varies with flight conditions and will be discussed later in connection with methods of thrust modulation.

Also on each map are shown the limiting exhaust-gas temperature and the control temperature corresponding to this limiting exhaust-gas temperature. The correlation between control temperature and exhaust-gas temperature is shown in figure 7 for a complete range of flight conditions. If the control temperature is set on the limiting indicated temperature, the true exhaust-gas temperature will be about $30^{\circ}$ R above the limiting value at low altitude, will approach the limiting value at an altitude of 45,000 feet, and will be somewhat below the limiting value at an altitude of 55,000 feet and low flight Mach numbers.

Thrust Modulation

Varying the engine speed and varying the exhaust-nozzle area are two simple methods of thrust modulation. The performance obtained by varying the exhaust-nozzle area at rated engine speed and by varying the engine speed at an exhaust-nozzle area of 2.685 square feet is shown in figures 8 to 10. The effect of altitude at flight Mach numbers of 0.16 and 0.64 and the effect of flight Mach number at an altitude of 35,000 feet are presented for thrust levels of 100, 90, 80, and 70 percent of maximum thrust. Maximum thrust is the thrust obtained at rated engine speed (6100 rpm) and rated turbine-outlet temperature ($1685^{\circ}$ R) for each flight condition.

Varying exhaust-nozzle area at rated engine speed. - For the method of thrust modulation in which the exhaust-nozzle area varies at rated engine speed, the specific fuel consumption would increase as altitude increased at any constant thrust level (figs. 8(b) and 9(b)). This increase is principally the result of a loss in compressor efficiency with an increase in corrected engine speed. Specific fuel consumption also increased as flight Mach number increased (fig. 10(b)). Modulation of thrust by this method, at rated engine speed, had very little effect on specific fuel consumption except at a thrust level of 70 percent of maximum. The higher specific fuel consumption at this condition was due to the exhaust-nozzle area approaching a value that gave very high tail-pipe pressure losses and also a low ideal air-cycle efficiency.

Varying engine speed at a constant exhaust-nozzle area. - Maximum thrust is defined as the thrust at rated engine speed and rated exhaust-gas temperature; therefore, at any given flight condition, there can be only single values of maximum thrust and specific fuel consumption at maximum thrust. The exhaust-nozzle area required to obtain rated exhaust-gas temperature at rated engine speed varied with flight conditions. For thrust levels of 90, 80, and 70 percent of maximum at an exhaust-nozzle area of 2.685 square feet, altitude had little effect on specific

fuel consumption (figs. 8(d) and 9(d)) because engine speed decreased as altitude was increased (figs. 8(c) and 9(c)), which caused the corrected engine speed to remain near the one for minimum specific fuel consumption. Minimum specific fuel consumption remained essentially constant with increase in altitude as previously discussed in the section Performance Maps. Specific fuel consumption increased with increase in flight Mach number (fig. 10(d)). Variations in thrust level from 90 to 70 percent of maximum had little effect on specific fuel consumption.


## Optimum Thrust Modulation

Comparison of the two methods of thrust modulation presented in the preceding section shows a higher specific fuel consumption by varying the exhaust-nozzle area at rated engine speed than by varying the engine speed at a constant exhaust-nozzle area. At an altitude of 35,000 feet and a flight Mach number of 0.64, the specific fuel consumption at 80 and 90 percent of maximum thrust was 1.14 pounds per hour per pound net thrust by the method of varying the engine speed compared with 1.24 pounds per hour per pound net thrust by the method of varying the exhaust-nozzle area. However, varying the exhaust-nozzle area is advantageous for rapid changes in thrust. At rated engine speed and any flight condition, the net thrust can be modulated about 50 percent of maximum by varying the exhaust-nozzle area.

The optimum thrust modulation schedule would be a combination of these two methods as shown by the optimum exhaust-nozzle schedule on the performance maps (fig. 6). This optimum exhaust-nozzle-area schedule varies considerably with changes in flight condition. However, a schedule that would be simple and nearly optimum for all flight conditions would be to hold the exhaust-nozzle area at approximately 3.0 square feet until rated engine speed is reached, and then close the exhaust nozzle until limiting exhaust-gas temperature is obtained. A smaller exhaust-nozzle area (about 2.8 sq ft) would be slightly better, but an overtemperature control would have to be provided to keep the exhaust-gas temperature within limits at certain flight conditions.


## Performance from Pumping Characteristics

Engine performance at flight conditions other than those presented in this report may be calculated from the pumping characteristics presented in figures 11 to 13. These figures show the variation of engine pressure ratio, corrected air flow, and corrected fuel flow with Reynolds number index for a range of engine temperature ratios and a range of corrected engine speeds from 5800 to 6300 rpm. The points shown are not actual data points but represent only the flight conditions at which data were obtained.

Engine pressure ratio decreased at an increasing rate as Reynolds number index was decreased (altitude increased or flight Mach number decreased). As previously discussed in the section Performance Maps, compressor pressure ratio increased with increase in altitude, but the component efficiencies decreased, thus requiring a large increase in turbine pressure ratio to supply component work. The over-all effect was a decrease in engine pressure ratio.

Corrected air flow was not particularly affected by variations in Reynolds number index above a value of about 0.45. However, as Reynolds number index was reduced below this critical value, the air flow decreased appreciably.

Although corrected fuel flow (fig. 13) is not a rigorous function of Reynolds number index, this relation provides a simple method of obtaining fuel flow at any flight condition. Corrected fuel flow increased as Reynolds number index was decreased because of reductions in component efficiencies.

From these figures the engine pressure ratio, corrected air flow, and corrected fuel flow can be obtained by selecting a flight condition (Reynolds number index), engine speed, and turbine-outlet temperature. Tail-pipe and exhaust-nozzle losses are presented in figures 14 and 15, respectively, to assist in calculating thrust. From the pumping characteristics and known losses in the tail pipe and exhaust nozzle, the net thrust, fuel flow, and specific fuel consumption of the engine and exhaust system can be determined. If the characteristics of the inlet system are known, the performance of the entire system can be determined.

The exhaust-nozzle discharge coefficient based on a cold projected area is presented in figure 16. From this curve exhaust-nozzle-outlet area may be calculated for a wide range of flight conditions.

### Summarized Performance

The altitude performance of the engine at rated conditions (engine speed, 6100 rpm; turbine-outlet temperature, 1685° R) is summarized in figures 17 and 18, in which the variation of net thrust and fuel flow with true airspeed is shown. The solid curves represent the experimental data and the dashed curves are extensions of the experimental data made by calculating performance from the pumping characteristics. The points shown are not actual data points, but represent only the flight conditions at which data were obtained.

Net thrust increased with airspeed except at very low airspeeds where it decreased slightly. Fuel flow increased as airspeed was increased over the entire range.

The net thrust and the fuel flow calculated from pumping characteristics compare within about ±4 percent with the experimental data. The specific fuel consumption obtained from calculated net thrust and fuel flow would be within about ±6 percent of the experimental data.

### Determination of Thrust in Flight

An accurate and simple indication of thrust is desired in order to simplify operation at critical flight conditions such as at take-off or during formation flying. Exhaust-nozzle pressure drop can be easily measured and provides a reasonably good correlation with jet thrust for a fixed-area exhaust nozzle as shown in reference 2.

The variation of scale jet thrust with exhaust-nozzle pressure drop for the YJ71-A-7 turbojet engine at three exhaust-nozzle areas is shown in figure 19 for a range of flight conditions. The faired lines from these three plots have been combined in figure 20 to show the effect of exhaust-nozzle area on the correlation. Since the exhaust-nozzle area affects only the slope of the curve, the correlation can be used for determining thrust in flight if the exhaust-nozzle area is known.

Accuracy in measuring average turbine-outlet total pressure at all flight conditions is essential for this correlation. A 1-percent error in measuring total pressure will cause about a 2-percent error in the jet-thrust value. The turbine-outlet total pressure used in this report was obtained by taking the arithmetic average of 21 probes (seven probes on each of three equally spaced rakes). Integrating total-pressure rakes could probably be used to measure this pressure.

### OPERATIONAL CHARACTERISTICS

The principal operational problem encountered during the investigation was associated with the surge characteristics of the compressor. The surge line of the compressor had a severe dip at engine speeds between 65 and 85 percent of rated engine speed (ref. 1). Although the engine was equipped with combustor-inlet bleed ports, accelerations at all altitudes were very slow. At altitudes above 35,000 feet, the engine could be started but could not be accelerated to rated engine speed even with the air bleed ports open. Modifications in compressor design to alleviate the acceleration problem are being considered by the manufacturer.

Another problem encountered was the very rapid deterioration and failure of the first turbine rotor stage. The blades of the first stage were hollow, and the material used had low thermal shock resistance. These factors combined with the high operating turbine-inlet temperatures resulted in severe reduction in turbine life. The life of the first-stage turbine rotor used in this investigation varied between 20 and 70 hours; however, the turbine stators and rotors were of an interim design.

## SUMMARY OF RESULTS

The following results were obtained from an altitude-wind-tunnel investigation of a YJ71-A-7 turbojet engine operating over a range of engine speeds and exhaust-nozzle areas at altitudes from 6000 to 55,000 feet and flight Mach numbers from 0.16 to 1.00.

1. The variation of corrected values of air flow, net thrust, and fuel flow with corrected engine speed was not defined by a single curve with changes in altitude at a given flight Mach number. The corrected air flow at rated corrected engine speed was 167 pounds per second at altitudes below 15,000 feet and decreased to about 163 pounds per second at an altitude of 45,000 feet.

2. A minimum specific fuel consumption of 0.925 to 0.950 pound per hour per pound net thrust was obtained at altitudes between 15,000 and 45,000 feet at a flight Mach number of 0.16. The minimum value occurred at the same exhaust-nozzle area (2.86 sq ft) but at lower engine speeds (approximately the same corrected engine speed) with increase in altitude.

3. An increase in flight Mach number at any altitude caused an appreciable increase in minimum specific fuel consumption. The minimum value occurred at smaller exhaust-nozzle areas and slightly higher engine speeds (approximately the same corrected engine speed) as flight Mach number increased. At an altitude of 35,000 feet, the minimum specific fuel consumption increased from 0.925 to 1.20 pounds per hour per pound net thrust as flight Mach number increased from 0.16 to 1.00.

4. The optimum exhaust-nozzle area - engine speed schedule varied with flight conditions. However, a schedule that would be nearly optimum for all flight conditions and yet simple to incorporate would be to maintain an exhaust-nozzle area of about 3.0 square feet until rated engine speed is reached and then reduce the exhaust-nozzle area until limiting exhaust-gas temperature is obtained.

5. Engine performance calculated from pumping characteristics was found to be in close agreement with experimental data and can therefore be considered an acceptable means for predicting performance characteristics at flight conditions other than those investigated.

6. A correlation between exhaust-nozzle pressure drop and jet thrust provided a reasonably accurate method of obtaining jet thrust in flight provided the exhaust-nozzle area is known.

7. Engine acceleration was severely limited by the surge characteristics of the compressor. At altitudes above 35,000 feet, the engine could be started but could not be accelerated to rated engine speed.

Lewis Flight Propulsion Laboratory
    National Advisory Committee for Aeronautics
        Cleveland, Ohio, April 13, 1953

APPENDIX A

SYMBOLS

The following symbols are used in this report:

A     cross-sectional area, sq ft

B     thrust scale reading, lb

$C_D$     discharge coefficient, ratio of flow area to cold projected exhaust-nozzle area

$C_v$     effective velocity coefficient, ratio of scale jet thrust to rake jet thrust calculated at exhaust-nozzle inlet

D     external drag of installation, lb

$F_j$     jet thrust, lb

$F_n$     net thrust, lb

g     acceleration due to gravity, 32.2 $ft/sec^2$

H     altitude, ft

M     Mach number

N     engine speed, rpm

P     total pressure, lb/sq ft abs

p     static pressure, lb/sq ft abs

R     gas constant, 53.3 ft-lb/(lb)($^O$R)

T     total temperature, $^O$R

t     static temperature, $^O$R

V     velocity, ft/sec or knots

$W_a$     air flow, lb/sec

$W_f$     fuel flow, lb/hr

$W_g$     gas flow, lb/sec

$\gamma$   ratio of specific heats for gases

$\delta_a$   ratio of ambient absolute static pressure to absolute static pressure of NACA standard atmosphere at respective altitude

$\delta_T$   ratio of engine-inlet absolute total pressure to absolute static pressure of NACA standard atmosphere at sea-level

$\theta_a$   ratio of absolute ambient static temperature to absolute static temperature of NACA standard atmosphere at the respective altitude

$\theta_T$   ratio of engine-inlet absolute total temperature to absolute static temperature of NACA standard atmosphere at sea level

$\varphi$   ratio of absolute viscosity of air at engine inlet to viscosity of NACA standard atmosphere at sea level

Subscripts:

a   air

f   fuel

i   indicated

j   jet

n   exhaust nozzle

r   rake

s   scale

0   free-stream conditions

1   compressor inlet

2   compressor outlet

3   turbine inlet

4   turbine outlet

5   diffuser outlet

6   exhaust-nozzle inlet

# APPENDIX B

## METHODS OF CALCULATION

Flight Mach number. - The flight Mach number, with complete ram pressure recovery assumed, was calculated from the expression

$$M_0 = \sqrt{\frac{2}{\gamma-1}\left[\left(\frac{P_1}{p_0}\right)^{\frac{\gamma_1-1}{\gamma_1}} - 1\right]}$$

Airspeed. - The following equation was used to calculate airspeed:

$$V_0 = M_0 \sqrt{\gamma g R t_0}$$

Temperature. - Total temperatures were determined from indicated temperatures with the following relation:

$$T = \frac{T_i\left(\frac{P}{p}\right)^{\frac{\gamma-1}{\gamma}}}{1 + 0.85\left[\left(\frac{P}{p}\right)^{\frac{\gamma-1}{\gamma}} - 1\right]}$$

where 0.85 is the impact recovery factor for the type of thermocouple used.

Air flow. - Air flow was determined from pressure and temperature measurements in the engine-inlet air duct by use of the equation

$$W_{a,1} = A_1 \sqrt{\frac{2g}{R}}\left(\frac{p_1}{\sqrt{T_1}}\right)\sqrt{\left(\frac{\gamma_1}{\gamma_1-1}\right)\left(\frac{P_1}{p_1}\right)^{\frac{\gamma_1-1}{\gamma_1}}\left[\left(\frac{P_1}{p_1}\right)^{\frac{\gamma_1-1}{\gamma_1}} - 1\right]}$$

Gas flow. - The total weight flow through the engine was calculated as follows:

$$W_{g,6} = W_{a,1} + \frac{W_f}{3600}$$

Scale thrust. - The jet thrust of the engine was determined from the balance-scale measurements by using the following equation:

$$F_{j,s} = B + D + \frac{W_a V_1}{g} + A_1(p_1 - p_0)$$

The last two terms of this expression represent the momentum and pressure forces on the installation at the slip joint in the inlet air duct. The external drag of the installation was determined with the engine inoperative.

Scale net thrust was obtained by subtracting the free-stream momentum of the inlet air from the scale jet thrust.

$$F_{n,s} = F_{j,s} - W_{a,1} \frac{V_0}{g}$$

Calculated thrust. - At any flight condition the following are known: $\delta_T$, $\theta_T$, $T_1$, $P_1$, $t_0$, $p_0$, and Reynolds number index $\delta_T / \varphi \sqrt{\theta_T}$ (for $\varphi$ see fig. 21).

When an engine speed and exhaust-gas temperature are selected, the following are obtainable: engine temperature ratio $T_6/T_1$; corrected engine speed, $\frac{N}{\sqrt{\theta_T}}$.

With the use of figures 11, 12, and 13, values are found for $P_4/P_1$, $\frac{W_a \sqrt{\theta_T}}{\delta_T}$, and $\frac{W_f}{\delta_T \sqrt{\theta_T}}$.

From these quantities, the turbine-outlet gas-flow parameter can be calculated

$$\frac{W_g \sqrt{T_6}}{P_4}$$

With the use of figures 14 and 15, the tail-pipe pressure loss $\frac{P_4 - P_6}{P_4}$ and the effective velocity coefficient $C_v$ may be found.

Rake jet thrust is given by the following equations based on exhaust-nozzle-outlet total pressure and temperature from the charts presented in reference 3:

$$F_{j,r} = \frac{W_g}{g} V_j \text{ (subcritical)}$$

$$F_{j,r} = \frac{W_g}{g} V_n + A_n(p_n - p_0) \text{ (supercritical)}$$

By definition

$$C_v = \frac{F_{j,s}}{F_{j,r}}$$

Therefore,

$$F_{j,s} = C_v F_{j,r}$$

Scale net thrust is then obtained by subtracting the free-stream momentum of the inlet air from the scale jet thrust

$$F_{n,s} = F_{j,s} - \frac{W_a V_0}{g}$$

## REFERENCES

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TABLE I. - PERFORMANCE DATA

(a) Exhaust-nozzle

| Run number | Altitude, H, ft | Ram pressure ratio, $\frac{P_1}{p_0}$ | Flight Mach number, $M_0$ | Tunnel static pressure, $p_0$, $\frac{lb}{sq\ ft\ abs}$ | Equivalent ambient air temperature, $t_0$, °R | Engine-inlet indicated temperature, $T_1$, °R | Reynolds number index, $\frac{\delta_T}{\varphi_T\sqrt{\theta_T}}$ | Engine speed $N$, rpm | Engine speed Adjusted, $\frac{N}{\sqrt{\theta_a}}$, rpm | Engine speed Corrected, $\frac{N}{\sqrt{\theta_T}}$, rpm | Engine total-pressure ratio, $\frac{P_4}{P_1}$ | Engine total-temperature ratio, $\frac{T_6}{T_1}$ | Net thrust $F_n$, lb | Net thrust Adjusted, $\frac{F_n}{\delta_a}$, lb | Net thrust Corrected, $\frac{F_n}{\delta_T}$, lb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,000 | 1.014 | 0.141 | 1688 | 523 | 525 | 0.789 | 5971 | 5827 | 5937 | 2.447 | 3.240 | 7604 | 7634 | 9,406 |
| 2 | | 1.019 | .164 | 1687 | 522 | 525 | .790 | 5849 | 5713 | 5816 | 2.330 | 3.147 | 6964 | 6999 | 8,573 |
| 3 | | 1.017 | .155 | 1687 | 523 | 526 | .790 | 5727 | 5588 | 5689 | 2.202 | 3.038 | 6357 | 6389 | 7,838 |
| 4 | | 1.020 | .169 | 1689 | 523 | 526 | .795 | 5606 | 5470 | 5568 | 2.091 | 2.962 | 5888 | 5920 | 7,240 |
| 5 | | 1.019 | .164 | 1692 | 522 | 525 | .795 | 5484 | 5356 | 5453 | 1.998 | 2.842 | 5256 | 5267 | 6,449 |
| 6 | | 1.022 | .176 | 1689 | 522 | 525 | .797 | 5362 | 5237 | 5331 | 1.892 | 2.766 | 4732 | 4751 | 5,797 |
| 7 | | 1.024 | .184 | 1687 | 521 | 525 | .797 | 5240 | 5123 | 5210 | 1.797 | 2.691 | 4191 | 4212 | 5,134 |
| 8 | 15,000 | 1.021 | 0.173 | 1188 | 488 | 491 | 0.611 | 6093 | 5948 | 6264 | 2.680 | 3.576 | 6195 | 6220 | 10,804 |
| 9 | | 1.021 | .173 | 1187 | 490 | 493 | .608 | 5971 | 5817 | 6126 | 2.617 | 3.467 | 5913 | 5943 | 10,324 |
| 10 | | 1.023 | .180 | 1186 | 490 | 493 | .608 | 5849 | 5698 | 6001 | 2.546 | 3.373 | 5585 | 5619 | 9,740 |
| 11 | | 1.025 | .188 | 1185 | 493 | 497 | .600 | 5727 | 5562 | 5853 | 2.410 | 3.254 | 5144 | 5180 | 8,961 |
| 12 | | 1.026 | .192 | 1186 | 491 | 495 | .605 | 5606 | 5455 | 5741 | 2.309 | 3.158 | 4771 | 4800 | 8,297 |
| 13 | 25,000 | 1.016 | 0.152 | 767 | 460 | 462 | 0.425 | 5971 | 5773 | 6329 | 2.769 | 3.716 | 4178 | 4274 | 11,347 |
| 14 | | 1.022 | .176 | 766 | 460 | 463 | .424 | 5848 | 5655 | 6194 | 2.687 | 3.613 | 3992 | 4092 | 10,786 |
| 15 | | 1.022 | .176 | 767 | 460 | 463 | .424 | 5727 | 5537 | 6065 | 2.612 | 3.512 | 3781 | 3868 | 10,205 |
| 16 | | 1.025 | .188 | 767 | 459 | 462 | .431 | 5606 | 5426 | 5942 | 2.505 | 3.413 | 3539 | 3620 | 9,527 |
| 17 | | 1.261 | .586 | 765 | 444 | 474 | .511 | 6093 | 5996 | 6373 | 2.735 | 3.700 | 4392 | 4506 | 9,632 |
| 18 | | 1.269 | .594 | 765 | 444 | 475 | .515 | 5971 | 5876 | 6240 | 2.669 | 3.571 | 4250 | 4361 | 9,261 |
| 19 | | 1.274 | .599 | 763 | 444 | 476 | .515 | 5848 | 5756 | 6106 | 2.586 | 3.471 | 4071 | 4189 | 8,863 |
| 20 | | 1.263 | .588 | 765 | 446 | 477 | .508 | 5727 | 5623 | 5973 | 2.501 | 3.350 | 3732 | 3829 | 8,173 |
| 21 | | 1.270 | .595 | 767 | 448 | 480 | .508 | 5606 | 5492 | 5830 | 2.378 | 3.256 | 3604 | 3687 | 7,828 |
| 22 | | 1.304 | .628 | 766 | 432 | 466 | .545 | 5484 | 5471 | 5786 | 2.338 | 3.182 | 3463 | 3550 | 7,335 |
| 23 | | 1.318 | .641 | 765 | 432 | 467 | .547 | 5240 | 5228 | 5523 | 2.065 | 2.931 | 2792 | 2865 | 5,860 |
| 24 | 35,000 | 1.025 | 0.188 | 476 | 456 | 459 | 0.270 | 5727 | 5324 | 6088 | 2.707 | 3.680 | 2436 | 2548 | 10,562 |
| 25 | | 1.029 | .203 | 479 | 454 | 459 | .273 | 5606 | 5221 | 5965 | 2.566 | 3.563 | 2287 | 2378 | 9,816 |
| 26 | | 1.031 | .210 | 480 | 457 | 461 | .272 | 5484 | 5092 | 5819 | 2.438 | 3.436 | 2161 | 2243 | 9,238 |
| 27 | | 1.029 | .203 | 479 | 457 | 461 | .271 | 5240 | 4865 | 5560 | 2.181 | 3.226 | 1750 | 1820 | 7,511 |
| 28 | | 1.304 | .628 | 477 | 431 | 465 | .342 | 5849 | 5592 | 6177 | 2.736 | 3.660 | 2798 | 2921 | 9,519 |
| 29 | | 1.308 | .632 | 477 | 431 | 465 | .342 | 5727 | 5476 | 6048 | 2.612 | 3.555 | 2604 | 2719 | 8,830 |
| 30 | | 1.309 | .633 | 479 | 431 | 466 | .347 | 5606 | 5360 | 5914 | 2.506 | 3.442 | 2429 | 2526 | 8,198 |
| 31 | | 1.322 | .645 | 481 | 418 | 453 | .360 | 5484 | 5324 | 5873 | 2.465 | 3.395 | 2460 | 2546 | 8,184 |
| 32 | | 1.325 | .647 | 480 | 420 | 455 | .360 | 5362 | 5194 | 5727 | 2.330 | 3.273 | 2194 | 2277 | 7,299 |
| 33 | | 1.319 | .642 | 480 | 420 | 455 | .358 | 5240 | 5075 | 5596 | 2.172 | 3.147 | 1978 | 2053 | 6,612 |
| 34 | | 1.874 | .992 | 478 | 393 | 470 | .481 | 5971 | 5977 | 6276 | 2.701 | 3.617 | 3795 | 3954 | 8,964 |
| 35 | | 1.883 | .996 | 477 | 391 | 469 | .483 | 5849 | 5872 | 6153 | 2.641 | 3.527 | 3617 | 3776 | 8,522 |
| 36 | | 1.882 | .996 | 476 | 391 | 468 | .482 | 5727 | 5750 | 6031 | 2.540 | 3.429 | 3421 | 3578 | 8,080 |
| 37 | | 1.880 | .995 | 474 | 391 | 468 | .480 | 5606 | 5628 | 5903 | 2.461 | 3.353 | 3194 | 3357 | 7,586 |
| 38 | | 1.907 | 1.007 | 475 | 393 | 473 | .483 | 5484 | 5489 | 5742 | 2.330 | 3.186 | 2990 | 3134 | 6,985 |
| 39 | | 1.894 | 1.001 | 479 | 395 | 474 | .483 | 5240 | 5233 | 5481 | 2.014 | 2.897 | 2340 | 2434 | 5,459 |
| 40 | | 1.902 | 1.005 | 480 | 508 | 611 | .351 | 5849 | 5151 | 5390 | 1.880 | 2.863 | 2082 | 2161 | 4,826 |
| 41 | | 1.906 | 1.006 | 478 | 512 | 616 | .347 | 5727 | 5024 | 5257 | 1.746 | 2.748 | 1778 | 1853 | 4,130 |
| 42 | | 1.908 | 1.007 | 477 | 511 | 615 | .347 | 5727 | 5029 | 5261 | 1.732 | 2.727 | 1763 | 1841 | 4,099 |
| 43 | | 1.912 | 1.009 | 477 | 513 | 617 | .346 | 5606 | 4913 | 5142 | 1.628 | 2.632 | 1521 | 1588 | 3,529 |
| 44 | 45,000 | 1.014 | 0.141 | 287 | 452 | 454 | 0.167 | 5240 | 4886 | 5602 | 2.302 | 3.399 | 1120 | 1202 | 8,144 |
| 45 | | 1.359 | .677 | 287 | 415 | 453 | .220 | 5727 | 5573 | 6134 | 2.741 | 3.786 | 1774 | 1904 | 9,626 |
| 46 | | 1.353 | .672 | 289 | 415 | 453 | .220 | 5606 | 5455 | 6004 | 2.675 | 3.711 | 1671 | 1781 | 9,043 |
| 47 | 55,000 | 1.565 | 0.827 | 170 | 397 | 451 | 0.151 | 5484 | 5456 | 5884 | 2.579 | 3.721 | 1110 | 1248 | 8,830 |
| 48 | | ----- | ----- | ---- | --- | 453 | ----- | 5362 | ---- | 5743 | ----- | ----- | ---- | ---- | ------ |
| 49 | | ----- | ----- | 163 | --- | 452 | ----- | 5240 | ---- | 5612 | ----- | ----- | ---- | ---- | ------ |
| 50 | | 1.588 | .841 | 170 | 397 | 453 | .153 | 5240 | 5213 | 5612 | 2.233 | 3.393 | 866 | 973 | 6,787 |
| 51 | | 2.179 | 1.117 | 168 | 361 | 451 | .208 | 5606 | 5853 | 6015 | 2.694 | 3.707 | 1483 | 1686 | 8,573 |
| 52 | | 2.153 | 1.107 | 170 | 362 | 451 | .208 | 5484 | 5714 | 5884 | 2.538 | 3.614 | 1416 | 1592 | 8,186 |
| 53 | | 2.151 | 1.107 | 172 | 363 | 452 | .209 | 5362 | 5582 | 5743 | 2.405 | 3.467 | 1268 | 1407 | 7,252 |
| 54 | | 2.222 | 1.133 | 171 | 359 | 451 | .210 | 5240 | 5481 | 5623 | 2.205 | 3.318 | 1216 | 1358 | 6,771 |

NACA

FOR YJ71-A-7 TURBOJET ENGINE

Area, 2.54 square feet

| Jet thrust | | | Air flow | | | Fuel flow | | | Specific fuel consumption | | | Exhaust-gas total temperature | | | Run number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_j$, lb | Adjusted $\dfrac{F_j}{\delta_a}$, lb | Corrected $\dfrac{F_j}{\delta_T}$, lb | $W_a$, $\dfrac{lb}{sec}$ | Adjusted $\dfrac{W_a\sqrt{\theta_a}}{\delta_a}$, $\dfrac{lb}{sec}$ | Corrected $\dfrac{W_a\sqrt{\theta_T}}{\delta_T}$, $\dfrac{lb}{sec}$ | $W_f$, $\dfrac{lb}{hr}$ | Adjusted $\dfrac{W_f}{\delta_a\sqrt{\theta_a}}$, $\dfrac{lb}{hr}$ | Corrected $\dfrac{W_f}{\delta_T\sqrt{\theta_T}}$, $\dfrac{lb}{hr}$ | $\dfrac{W_f}{F_n}$, $\dfrac{lb/hr}{lb\ thrust}$ | Adjusted $\dfrac{W_f}{F_n\sqrt{\theta_a}}$, $\dfrac{lb/hr}{lb\ thrust}$ | Corrected $\dfrac{W_f}{F_n\sqrt{\theta_T}}$, $\dfrac{lb/hr}{lb\ thrust}$ | $T_6$, °R | Adjusted $\dfrac{T_6}{\theta_a}$, °R | Corrected $\dfrac{T_6}{\theta_T}$, °R | |
| 8248 | 8281 | 10,203 | 130.8 | 134.6 | 162.7 | 7811 | 7652 | 9,607 | 1.03 | 1.00 | 1.02 | 1701 | 1620 | 1682 | 1 |
| 7691 | 7729 | 9,468 | 127.0 | 130.7 | 157.3 | 7290 | 7156 | 8,922 | 1.05 | 1.02 | 1.04 | 1652 | 1576 | 1633 | 2 |
| 7013 | 7048 | 8,647 | 121.5 | 125.1 | 150.6 | 6625 | 6497 | 8,114 | 1.04 | 1.02 | 1.04 | 1598 | 1522 | 1577 | 3 |
| 6577 | 6610 | 8,090 | 117.1 | 120.4 | 144.7 | 6070 | 5947 | 7,410 | 1.03 | 1.00 | 1.02 | 1558 | 1484 | 1537 | 4 |
| 5902 | 5914 | 7,242 | 112.9 | 115.8 | 139.3 | 5400 | 5285 | 6,588 | 1.03 | 1.00 | 1.02 | 1492 | 1423 | 1475 | 5 |
| 5392 | 5414 | 6,605 | 107.8 | 110.7 | 132.7 | 4920 | 4824 | 5,993 | 1.04 | 1.02 | 1.03 | 1452 | 1385 | 1435 | 6 |
| 4849 | 4873 | 5,940 | 102.7 | 105.5 | 126.5 | 4450 | 4373 | 5,421 | 1.06 | 1.04 | 1.06 | 1413 | 1351 | 1397 | 7 |
| 6777 | 6804 | 11,819 | 99.8 | 102.6 | 169.3 | 6450 | 6321 | 11,564 | 1.04 | 1.02 | 1.07 | 1756 | 1673 | 1856 | 8 |
| 6488 | 6520 | 11,328 | 98.4 | 101.4 | 167.5 | 6090 | 5963 | 10,909 | 1.03 | 1.00 | 1.06 | 1709 | 1622 | 1800 | 9 |
| 6172 | 6209 | 10,764 | 96.5 | 99.6 | 164.1 | 5690 | 5576 | 10,181 | 1.02 | .99 | 1.05 | 1663 | 1578 | 1751 | 10 |
| 5737 | 5777 | 9,994 | 93.1 | 96.5 | 158.7 | 5210 | 5095 | 9,276 | 1.01 | .98 | 1.04 | 1617 | 1525 | 1688 | 11 |
| 5358 | 5390 | 9,318 | 90.4 | 93.4 | 153.5 | 4800 | 4699 | 8,547 | 1.01 | .98 | 1.03 | 1563 | 1480 | 1640 | 12 |
| 4507 | 4611 | 12,241 | 66.3 | 70.2 | 170.0 | 4280 | 4233 | 12,322 | 1.02 | 0.99 | 1.09 | 1717 | 1605 | 1930 | 13 |
| 4369 | 4478 | 11,805 | 65.5 | 69.4 | 167.2 | 4055 | 4019 | 11,602 | 1.02 | .98 | 1.08 | 1673 | 1564 | 1875 | 14 |
| 4152 | 4247 | 11,206 | 64.4 | 68.1 | 164.1 | 3805 | 3764 | 10,874 | 1.01 | .97 | 1.07 | 1626 | 1520 | 1823 | 15 |
| 3926 | 4016 | 10,569 | 63.1 | 66.7 | 160.2 | 3560 | 3525 | 10,160 | 1.01 | .97 | 1.07 | 1577 | 1477 | 1773 | 16 |
| 5910 | 6064 | 12,961 | 80.8 | 84.2 | 169.3 | 5400 | 5452 | 12,386 | 1.23 | 1.21 | 1.29 | 1754 | 1699 | 1919 | 17 |
| 5789 | 5940 | 12,614 | 80.7 | 84.1 | 168.3 | 5220 | 5271 | 11,886 | 1.23 | 1.21 | 1.28 | 1696 | 1643 | 1852 | 18 |
| 5600 | 5762 | 12,191 | 79.5 | 83.1 | 165.8 | 4750 | 4810 | 10,796 | 1.17 | 1.15 | 1.22 | 1652 | 1600 | 1801 | 19 |
| 5197 | 5332 | 11,381 | 77.5 | 80.9 | 162.7 | 4380 | 4413 | 10,004 | 1.17 | 1.15 | 1.22 | 1598 | 1541 | 1739 | 20 |
| 5054 | 5170 | 10,977 | 75.7 | 79.0 | 158.0 | 3930 | 3939 | 8,877 | 1.09 | 1.07 | 1.13 | 1563 | 1500 | 1691 | 21 |
| 5009 | 5134 | 10,609 | 77.7 | 79.8 | 156.0 | 3950 | 4040 | 8,826 | 1.14 | 1.14 | 1.20 | 1483 | 1476 | 1651 | 22 |
| 4252 | 4363 | 8,925 | 71.9 | 73.9 | 143.1 | 3215 | 3291 | 7,114 | 1.15 | 1.15 | 1.21 | 1369 | 1363 | 1521 | 23 |
| 2683 | 2806 | 11,633 | 40.3 | 45.3 | 164.3 | 2600 | 2528 | 11,985 | 1.07 | 0.99 | 1.13 | 1689 | 1460 | 1909 | 24 |
| 2547 | 2649 | 10,932 | 39.5 | 44.2 | 159.4 | 2410 | 2335 | 11,005 | 1.05 | .98 | 1.12 | 1632 | 1415 | 1847 | 25 |
| 2422 | 2514 | 10,354 | 38.2 | 42.7 | 154.0 | 2240 | 2159 | 10,102 | 1.04 | .96 | 1.10 | 1584 | 1366 | 1784 | 26 |
| 1981 | 2060 | 8,502 | 35.0 | 39.2 | 141.6 | 1830 | 1767 | 8,335 | 1.05 | .97 | 1.11 | 1487 | 1282 | 1674 | 27 |
| 3831 | 4000 | 13,033 | 52.0 | 56.8 | 167.5 | 3350 | 3344 | 12,036 | 1.20 | 1.14 | 1.26 | 1702 | 1556 | 1898 | 28 |
| 3626 | 3786 | 12,296 | 51.2 | 55.9 | 164.2 | 3125 | 3119 | 11,190 | 1.20 | 1.15 | 1.27 | 1653 | 1511 | 1843 | 29 |
| 3432 | 3569 | 11,583 | 50.1 | 54.6 | 160.4 | 2900 | 2884 | 10,328 | 1.19 | 1.14 | 1.26 | 1604 | 1466 | 1785 | 30 |
| 3420 | 3540 | 11,378 | 51.0 | 54.3 | 158.4 | 2770 | 2783 | 9,871 | 1.13 | 1.09 | 1.21 | 1538 | 1450 | 1764 | 31 |
| 3183 | 3304 | 10,590 | 48.9 | 52.4 | 152.4 | 2520 | 2534 | 8,953 | 1.15 | 1.11 | 1.23 | 1489 | 1397 | 1699 | 32 |
| 2909 | 3020 | 9,725 | 46.5 | 49.8 | 145.5 | 2250 | 2262 | 8,033 | 1.14 | 1.10 | 1.22 | 1432 | 1343 | 1634 | 33 |
| 6060 | 6315 | 14,314 | 75.6 | 78.7 | 169.9 | 4755 | 4960 | 11,805 | 1.25 | 1.25 | 1.32 | 1700 | 1705 | 1879 | 34 |
| 5870 | 6128 | 13,830 | 75.1 | 78.1 | 168.2 | 4505 | 4722 | 11,165 | 1.25 | 1.25 | 1.31 | 1654 | 1667 | 1831 | 35 |
| 5634 | 5893 | 13,308 | 73.8 | 76.9 | 165.5 | 4190 | 4401 | 10,421 | 1.23 | 1.23 | 1.29 | 1605 | 1618 | 1780 | 36 |
| 5345 | 5618 | 12,694 | 71.8 | 75.2 | 161.9 | 3950 | 4168 | 9,878 | 1.24 | 1.24 | 1.30 | 1569 | 1582 | 1740 | 37 |
| 5106 | 5351 | 11,928 | 69.6 | 72.9 | 155.2 | 3605 | 3782 | 8,816 | 1.21 | 1.21 | 1.26 | 1507 | 1512 | 1652 | 38 |
| 4263 | 4434 | 9,946 | 63.4 | 66.0 | 141.5 | 2820 | 2929 | 6,882 | 1.21 | 1.20 | 1.26 | 1373 | 1370 | 1502 | 39 |
| 3922 | 4071 | 9,091 | 53.3 | 62.8 | 134.1 | 3150 | 2879 | 6,729 | 1.51 | 1.33 | 1.39 | 1749 | 1357 | 1485 | 40 |
| 3525 | 3673 | 8,189 | 50.4 | 59.8 | 127.4 | 2770 | 2552 | 5,907 | 1.56 | 1.37 | 1.43 | 1693 | 1303 | 1426 | 41 |
| 3508 | 3662 | 8,156 | 50.3 | 59.8 | 127.4 | 2740 | 2512 | 5,852 | 1.55 | 1.37 | 1.43 | 1677 | 1293 | 1415 | 42 |
| 3189 | 3329 | 7,398 | 47.9 | 52.1 | 121.2 | 2450 | 2241 | 5,213 | 1.61 | 1.41 | 1.48 | 1624 | 1247 | 1366 | 43 |
| 1215 | 1304 | 8,834 | 20.8 | ?? | .41.5 | 1195 | 1195 | 9,285 | 1.07 | 0.99 | 1.14 | 1543 | 1342 | 1764 | 44 |
| 2463 | 2643 | 13,364 | 32.? | ?? | 166.2 | 2210 | 2308 | 12,843 | 1.25 | 1.21 | 1.33 | 1715 | 1624 | 1967 | 45 |
| 2335 | 2489 | 12,637 | 3?.? | ?.9 | 161.1 | 2055 | 2132 | 11,912 | 1.23 | 1.20 | 1.32 | 1681 | 1592 | 1928 | 46 |
| 1631 | 1833 | 12,975 | 20.7 | 23.5 | 154.0 | 1362 | 1523 | 11,622 | 1.23 | 1.22 | 1.32 | 1678 | 1661 | 1931 | 47 |
| ---- | ---- | ------- | ---- | ---- | ----- | 1228 | ---- | ------ | ---- | ---- | ---- | ---- | ---- | ---- | 48 |
| ---- | ---- | ------- | ---- | ---- | ----- | 1104 | ---- | ------ | ---- | ---- | ---- | ---- | ---- | ---- | 49 |
| 1355 | 1523 | 10,619 | 19.2 | 21.7 | 140.3 | 1107 | 1238 | 9,295 | 1.28 | 1.27 | 1.37 | 1537 | 1521 | 1763 | 50 |
| 2454 | 2790 | 14,187 | 30.0 | 32.7 | 161.9 | 1945 | 2309 | 12,065 | 1.31 | 1.37 | 1.41 | 1672 | 1821 | 1924 | 51 |
| 2353 | 2645 | 13,603 | 29.2 | 31.5 | 157.4 | 1775 | 2079 | 11,013 | 1.25 | 1.31 | 1.35 | 1630 | 1770 | 1876 | 52 |
| 2195 | 2436 | 12,553 | 28.2 | 30.1 | 150.6 | 1630 | 1884 | 9,985 | 1.28 | 1.34 | 1.38 | 1567 | 1697 | 1797 | 53 |
| 2126 | 2375 | 11,838 | 27.8 | 29.7 | 144.4 | 1450 | 1894 | 8,664 | 1.19 | 1.25 | 1.28 | 1492 | 1634 | 1717 | 54 |
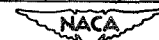
TABLE I. – Continued. PERFORMANCE

(b) Exhaust-nozzle

| Run num-ber | Alti-tude, H, ft | Ram pres-sure ratio, $\frac{P_1}{p_0}$ | Flight Mach number, $M_0$ | Tunnel static pres-sure, $p_0$, lb sq ft abs | Equiva-lent ambient air temper-ature, $t_0$, °R | Engine-inlet indi-cated temper-ature, $T_1$, °R | Reynolds number index, $\frac{\delta_T}{\varphi_T\sqrt{\theta_T}}$ | N, rpm | Ad-justed $\frac{N}{\sqrt{\theta_a}}$, rpm | Cor-rected $\frac{N}{\sqrt{\theta_T}}$, rpm | Engine total-pres-sure ratio, $\frac{P_4}{P_1}$ | Engine total-temper-ature ratio, $\frac{T_6}{T_1}$ | $F_n$, lb | Ad-justed $\frac{F_n}{\delta_a}$, lb | Cor-rected $\frac{F_n}{\delta_T}$, lb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,000 | 1.011 | 0.125 | 1684 | 523 | 525 | 0.789 | 6215 | 6065 | 6180 | 2.396 | 3.189 | 7694 | 7748 | 9,564 |
| 2 | | 1.011 | .125 | 1687 | 523 | 525 | .789 | 6093 | 5946 | 6058 | 2.346 | 3.133 | 7438 | 7475 | 9,223 |
| 3 | | 1.016 | .152 | 1684 | 523 | 525 | .789 | 5971 | 5827 | 5937 | 2.260 | 3.055 | 6910 | 6958 | 8,548 |
| 4 | | 1.017 | .155 | 1687 | 523 | 526 | .791 | 5849 | 5707 | 5810 | 2.171 | 2.968 | 6451 | 6483 | 7,961 |
| 5 | | 1.016 | .152 | 1690 | 524 | 526 | .792 | 5727 | 5583 | 5689 | 2.078 | 2.886 | 5941 | 5959 | 7,319 |
| 6 | | 1.021 | .173 | 1687 | 522 | 525 | .795 | 5606 | 5475 | 5574 | 1.974 | 2.798 | 5324 | 5351 | 6,543 |
| 7 | | 1.021 | .173 | 1687 | 523 | 525 | .795 | 5484 | 5356 | 5453 | 1.871 | 2.714 | 4796 | 4820 | 5,894 |
| 8 | | 1.021 | .173 | 1690 | 523 | 525 | .796 | 5362 | 5237 | 5331 | 1.784 | 2.642 | 4319 | 4332 | 5,299 |
| 9 | | 1.020 | .169 | 1688 | 523 | ·525 | .795 | 5240 | 5118 | 5210 | 1.702 | 2.571 | 3878 | 3894 | 4,766 |
| 10 | 15,000 | 1.020 | 0.169 | 1186 | 496 | 499 | 0.595 | 6093 | 5899 | 6215 | 2.460 | 3.301 | 5557 | 5590 | 9,719 |
| 11 | | 1.025 | .188 | 1184 | 493 | 496 | .600 | 5971 | 5799 | 6108 | 2.395 | 3.228 | 5340 | 5383 | 9,308 |
| 12 | | 1.022 | .176 | 1188 | 493 | 496 | .600 | 5849 | 5681 | 5984 | 2.325 | 3.143 | 5123 | 5143 | 8,929 |
| 13 | | 1.021 | .173 | 1184 | 493 | 496 | .599 | 5727 | 5562 | 5859 | 2.255 | 3.058 | 4793 | 4812 | 8,359 |
| 14 | | 1.023 | .180 | 1185 | 493 | 496 | .598 | 5606 | 5445 | 5735 | 2.144 | 2.968 | 4366 | 4397 | 7,623 |
| 15 | 25,000 | 1.021 | 0.173 | 765 | 460 | 463 | 0.424 | 6093 | 5891 | 6452 | 2.601 | 3.603 | 3933 | 4035 | 10,654 |
| 16 | | 1.021 | .173 | 767 | 460 | 463 | .424 | 5971 | 5773 | 6323 | 2.549 | 3.484 | 3789 | 3876 | 10,238 |
| 17 | | 1.018 | .160 | 765 | 462 | 464 | .423 | 5849 | 5643 | 6188 | 2.494 | 3.373 | 3681 | 3773 | 9,987 |
| 18 | | 1.022 | .176 | 767 | 461 | 464 | .424 | 5727 | 5531 | 6059 | 2.411 | 3.280 | 3462 | 3542 | 9,344 |
| 19 | | 1.022 | .176 | 765 | 461 | 464 | .424 | 5606 | 5414 | 5931 | 2.324 | ----- | 3244 | 3328 | 8,778 |
| 20 | | 1.291 | .616 | 766 | 457 | 492 | .496 | 6093 | 5910 | 6258 | 2.486 | 3.352 | 3923 | 4021 | 8,395 |
| 21 | | 1.299 | .623 | 762 | 457 | 492 | .496 | 5971 | 5792 | 6132 | 2.408 | 3.244 | 3775 | 3888 | 8,067 |
| 22 | | 1.295 | .619 | 765 | 458 | 493 | .495 | 5849 | 5668 | 6001 | 2.316 | 3.142 | 3541 | 3633 | 7,560 |
| 23 | | 1.298 | .622 | 762 | 458 | 493 | .495 | 5727 | 5549 | 5876 | 2.233 | 3.057 | 3340 | 3440 | 7,148 |
| 24 | | 1.298 | .622 | 766 | 458 | 493 | .495 | 5606 | 5432 | 5752 | 2.125 | 2.957 | 3021 | 3097 | 6,432 |
| 25 | | 1.314 | .637 | 768 | 430 | 465 | .550 | 5484 | 5484 | 5791 | 2.154 | 2.978 | 3185 | 3255 | 6,679 |
| 26 | | 1.313 | .636 | 768 | 430 | 465 | .549 | 5240 | 5240 | 5533 | 1.911 | 2.757 | 2510 | 2568 | 5,274 |
| 27 | 35,000 | 1.029 | 0.203 | 479 | 454 | 458 | 0.273 | 6093 | 5674 | 6483 | 2.667 | 3.771 | 2569 | 2672 | 11,026 |
| 28 | | 1.017 | .155 | 479 | 456 | 458 | .270 | 5971 | 5551 | 6353 | 2.655 | 3.662 | 2478 | 2577 | 10,767 |
| 29 | | 1.015 | .147 | 478 | 456 | 458 | .270 | 5849 | 5437 | 6223 | 2.604 | 3.566 | 2425 | 2527 | 10,580 |
| 30 | | 1.015 | .147 | 478 | 456 | 458 | .270 | 5727 | 5323 | 6094 | 2.511 | 3.452 | 2283 | 2379 | 9,961 |
| 31 | | 1.017 | .155 | 479 | 456 | 458 | .270 | 5606 | 5212 | 5965 | 2.409 | 3.354 | 2110 | 2194 | 9,168 |
| 32 | | 1.025 | .188 | 478 | 458 | 461 | .271 | 5484 | 5086 | 5819 | 2.271 | 3.230 | 1967 | 2050 | 8,494 |
| 33 | | 1.021 | .173 | 478 | 459 | 462 | .268 | 5240 | 4855 | 5554 | 2.057 | 3.041 | 1599 | 1666 | 6,933 |
| 34 | | 1.305 | .629 | 478 | 431 | 465 | .342 | 6093 | 5826 | 6434 | 2.630 | 3.645 | 2756 | 2872 | 9,346 |
| 35 | | 1.302 | .626 | 480 | 430 | 464 | .341 | 5971 | 5715 | 6317 | 2.584 | 3.547 | 2698 | 2801 | 9,135 |
| 36 | | 1.305 | .629 | 479 | 429 | 463 | .341 | 5849 | 5605 | 6194 | 2.518 | 3.436 | 2561 | 2663 | 8,672 |
| 37 | | 1.301 | .625 | 479 | 430 | 464 | .341 | 5727 | 5482 | 6059 | 2.440 | 3.332 | 2410 | 2506 | 8,184 |
| 38 | | 1.309 | .633 | 479 | 429 | 463 | .343 | 5606 | 5372 | 5937 | 2.338 | 3.227 | 2221 | 2310 | 7,496 |
| 39 | | 1.310 | .634 | 478 | 420 | 454 | .357 | 5484 | 5312 | 5862 | 2.294 | 3.163 | 2153 | 2243 | 7,277 |
| 40 | | 1.302 | .626 | 480 | 422 | 454 | .357 | 5362 | 5181 | 5727 | 2.157 | 3.033 | 1929 | 2002 | 6,532 |
| 41 | | 1.310 | .634 | 481 | 421 | 454 | .358 | 5240 | 5069 | 5596 | 2.019 | 2.923 | 1747 | 1808 | 5,868 |
| 42 | | 1.881 | .995 | 479 | 392 | 470 | .487 | 6093 | 6105 | 6404 | 2.541 | 3.489 | 3650 | 3796 | 8,574 |
| 43 | | 1.883 | .996 | 478 | 392 | 470 | .486 | 5971 | 5983 | 6276 | 2.476 | 3.391 | 3506 | 3653 | 8,243 |
| 44 | | 1.879 | .994 | 481 | 392 | 470 | .488 | 5849 | 5861 | 6147 | 2.420 | 3.277 | 3353 | 3470 | 7,849 |
| 45 | | 1.885 | .997 | 477 | 391 | 469 | .483 | 5727 | 5750 | 6025 | 2.326 | 3.183 | 3142 | 3280 | 7,396 |
| 46 | | 1.885 | .997 | 480 | 391 | 469 | .489 | 5606 | 5628 | 5898 | 2.240 | 3.083 | 2947 | 3059 | 6,890 |
| 47 | | 1.914 | 1.010 | 476 | 392 | 472 | .487 | 5484 | 5495 | 5753 | 2.135 | 2.962 | 2660 | 2782 | 6,179 |
| 48 | | 1.911 | 1.009 | 474 | 392 | 472 | .481 | 5240 | 5250 | 5497 | 1.877 | 2.733 | 2110 | 2218 | 4,929 |
| 49 | 45,000 | 1.017 | 0.155 | 288 | 456 | 458 | 0.167 | 5727 | 5316 | 6094 | 2.560 | 3.638 | 1421 | 1519 | 10,262 |
| 50 | | 1.028 | .199 | 289 | 455 | 459 | .167 | 5606 | 5210 | 5959 | 2.451 | 3.521 | 1314 | 1401 | 9,362 |
| 51 | | 1.010 | .118 | 287 | 453 | 454 | .167 | 5606 | 5221 | 5993 | 2.507 | 3.520 | 1406 | 1509 | 10,260 |
| 52 | | 1.018 | .160 | 284 | 452 | 454 | .166 | 5484 | 5114 | 5862 | 2.391 | 3.392 | 1270 | 1378 | 9,299 |
| 53 | | 1.021 | .173 | 287 | 450 | 453 | .167 | 5362 | 5011 | 5743 | 2.253 | 3.267 | 1140 | 1223 | 8,233 |
| 54 | | 1.014 | .141 | 288 | 454 | 456 | .167 | 5240 | 4875 | 5591 | 2.127 | 3.121 | 1016 | 1086 | 7,363 |
| 55 | | 1.351 | .670 | 288 | 417 | 454 | .220 | 5971 | 5797 | 6383 | 2.728 | 3.758 | 1766 | 1888 | 9,607 |
| 56 | | 1.353 | .672 | 289 | 417 | 455 | .220 | 5849 | 5678 | 6247 | 2.588 | 3.640 | 1710 | 1823 | 9,255 |
| 57 | | 1.353 | .672 | 289 | 416 | 454 | .220 | 5727 | 5567 | 6122 | 2.542 | 3.537 | 1621 | 1728 | 8,773 |
| 58 | | 1.360 | .678 | 289 | 416 | 454 | .221 | 5606 | 5449 | 5993 | 2.445 | 3.465 | 1533 | 1634 | 8,254 |
| 59 | 55,000 | 1.571 | 0.830 | 168 | 397 | 452 | 0.151 | 5727 | 5698 | 6139 | 2.591 | 3.708 | 1120 | 1273 | 8,977 |
| 60 | | 1.592 | .843 | 169 | 396 | 452 | .153 | 5606 | 5585 | 6010 | 2.442 | 3.573 | 1106 | 1250 | 8,700 |
| 61 | | 1.580 | .836 | 169 | 397 | 452 | .152 | 5484 | 5456 | 5879 | 2.345 | 3.431 | 949 | 1072 | 7,521 |
| 62 | | 1.573 | .832 | 171 | 397 | 452 | .153 | 5362 | 5335 | 5748 | 2.164 | 3.290 | 888 | 992 | 6,985 |
| 63 | | 1.576 | .833 | 172 | 397 | 452 | .154 | 5240 | 5213 | 5617 | 2.044 | 3.164 | 768 | 852 | 5,997 |
| 64 | | 2.163 | 1.111 | 172 | 362 | 451 | .207 | 5971 | 6222 | 6407 | 2.704 | 3.807 | 1643 | 1824 | 9,345 |
| 65 | | 2.173 | 1.115 | 168 | 361 | 451 | .207 | 5484 | 5725 | 5884 | 2.353 | ----- | 1241 | 1411 | 7,194 |
| 66 | | 2.218 | 1.131 | 170 | 360 | 452 | .210 | 5362 | 5603 | 5743 | 2.154 | 3.206 | 1223 | 1375 | 6,865 |
| 67 | | 2.229 | 1.135 | 170 | 359 | 452 | .210 | 5240 | 5481 | 5612 | 2.005 | 3.088 | 1115 | 1253 | 6,225 |

DATA FOR YJ71-A-7 TURBOJET ENGINE

area, 2.685 square feet

| Jet thrust | | | Air flow | | | Fuel flow | | | Specific fuel consumption | | | Exhaust-gas total temperature | | | Run number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_J$, lb | Adjusted, $\frac{F_J}{\delta_a}$ lb | Corrected, $\frac{F_J}{\delta_T}$ lb | $W_a$, $\frac{lb}{sec}$ | Adjusted, $\frac{W_a\sqrt{\theta_a}}{\delta_a}$ $\frac{lb}{sec}$ | Corrected, $\frac{W_a\sqrt{\theta_T}}{\delta_T}$ $\frac{lb}{sec}$ | $W_f$, $\frac{lb}{hr}$ | Adjusted, $\frac{W_f}{\delta_a\sqrt{\theta_a}}$ $\frac{lb}{hr}$ | Corrected, $\frac{W_f}{\delta_T\sqrt{\theta_T}}$ $\frac{lb}{hr}$ | $\frac{W_f}{F_n}$, $\frac{lb/hr}{lb\ thrust}$ | Adjusted, $\frac{W_f}{F_n\sqrt{\theta_a}}$ $\frac{lb/hr}{lb\ thrust}$ | Corrected, $\frac{W_f}{F_n\sqrt{\theta_T}}$ $\frac{lb/hr}{lb\ thrust}$ | $T_6$, °R | Adjusted, $\frac{T_6}{\theta_a}$, °R | Corrected, $\frac{T_6}{\theta_T}$, °R | |
| 8279 | 8337 | 10,291 | 135.0 | 139.4 | 168.8 | 7867 | 7731 | 9,723 | 1.02 | 1.00 | 1.02 | 1674 | 1594 | 1655 | 1 |
| 8021 | 8061 | 9,946 | 134.5 | 138.6 | 167.8 | 7528 | 7383 | 9,281 | 1.01 | .99 | 1.01 | 1645 | 1566 | 1626 | 2 |
| 7600 | 7653 | 9,401 | 130.5 | 134.7 | 162.3 | 7070 | 6947 | 8,696 | 1.02 | 1.00 | 1.02 | 1604 | 1527 | 1586 | 3 |
| 7136 | 7172 | 8,806 | 126.8 | 130.6 | 157.4 | 6535 | 6409 | 8,010 | 1.01 | .99 | 1.01 | 1561 | 1486 | 1540 | 4 |
| 6587 | 6607 | 8,115 | 122.9 | 126.5 | 152.3 | 6050 | 5916 | 7,403 | 1.02 | .99 | 1.01 | 1518 | 1443 | 1498 | 5 |
| 6038 | 6068 | 7,421 | 118.4 | 121.8 | 146.4 | 5540 | 5438 | 6,769 | 1.04 | 1.02 | 1.03 | 1469 | 1401 | 1452 | 6 |
| 5477 | 5504 | 6,731 | 112.9 | 116.2 | 139.6 | 4950 | 4859 | 6,049 | 1.03 | 1.01 | 1.03 | 1425 | 1359 | 1409 | 7 |
| 4971 | 4986 | 6,099 | 108.2 | 111.1 | 133.5 | 4520 | 4428 | 5,514 | 1.05 | 1.02 | 1.04 | 1387 | 1323 | 1371 | 8 |
| 4484 | 4502 | 5,511 | 103.1 | 106.0 | 127.4 | 4120 | 4040 | 5,035 | 1.06 | 1.04 | 1.06 | 1353 | 1291 | 1338 | 9 |
| 6121 | 6158 | 10,706 | 98.5 | 102.3 | 168.9 | 5705 | 5557 | 10,177 | 1.03 | 0.99 | 1.05 | 1647 | 1544 | 1713 | 10 |
| 5963 | 6011 | 10,394 | 97.7 | 101.4 | 166.5 | 5390 | 5277 | 9,611 | 1.01 | .98 | 1.03 | 1601 | 1510 | 1676 | 11 |
| 5695 | 5718 | 9,926 | 96.0 | 99.3 | 163.7 | 5070 | 4944 | 9,041 | .99 | .96 | 1.01 | 1559 | 1470 | 1632 | 12 |
| 5342 | 5363 | 9,316 | 93.7 | 96.9 | 159.8 | 4720 | 4602 | 8,422 | .98 | .96 | 1.01 | 1517 | 1431 | 1588 | 13 |
| 4917 | 4951 | 8,585 | 90.4 | 93.7 | 154.3 | 4340 | 4245 | 7,752 | .99 | .96 | 1.02 | 1472 | 1388 | 1541 | 14 |
| 4309 | 4421 | 11,673 | 66.4 | 70.5 | 169.9 | 4080 | 4048 | 11,706 | 1.04 | 1.00 | 1.10 | 1668 | 1559 | 1870 | 15 |
| 4163 | 4259 | 11,248 | 66.2 | 70.0 | 168.9 | 3850 | 3809 | 11,016 | 1.02 | .98 | 1.08 | 1613 | 1508 | 1808 | 16 |
| 4025 | 4126 | 10,920 | 65.7 | 69.8 | 168.5 | 3640 | 3600 | 10,448 | .99 | .95 | 1.05 | 1565 | 1457 | 1751 | 17 |
| 3834 | 3922 | 10,348 | 64.5 | 68.4 | 164.7 | 3430 | 3389 | 9,795 | .99 | .96 | 1.05 | 1522 | 1420 | 1703 | 18 |
| 3605 | 3699 | 9,755 | 62.7 | 66.6 | 160.5 | 3235 | 3205 | 9,263 | 1.00 | .96 | 1.06 | ---- | ---- | ---- | 19 |
| 5553 | 5692 | 11,883 | 81.3 | 85.9 | 169.5 | 4785 | 4757 | 10,516 | 1.22 | 1.18 | 1.25 | 1649 | 1552 | 1740 | 20 |
| 5411 | 5573 | 11,563 | 80.5 | 85.5 | 167.6 | 4450 | 4447 | 9,766 | 1.18 | 1.14 | 1.21 | 1596 | 1502 | 1684 | 21 |
| 5133 | 5266 | 10,959 | 78.9 | 83.5 | 164.1 | 4140 | 4116 | 9,069 | 1.17 | 1.13 | 1.20 | 1549 | 1454 | 1631 | 22 |
| 4898 | 5045 | 10,482 | 76.8 | 81.6 | 160.2 | 3850 | 3843 | 8,453 | 1.15 | 1.12 | 1.18 | 1507 | 1415 | 1587 | 23 |
| 4537 | 4650 | 9,659 | 74.7 | 79.1 | 155.1 | 3620 | 3596 | 7,907 | 1.20 | 1.16 | 1.23 | 1458 | 1369 | 1535 | 24 |
| 4769 | 4874 | 10,001 | 78.7 | 80.4 | 156.2 | 3605 | 3684 | 7,983 | 1.13 | 1.13 | 1.20 | 1385 | 1385 | 1544 | 25 |
| 3966 | 4057 | 8,333 | 72.4 | 74.1 | 144.0 | 2890 | 2956 | 6,412 | 1.15 | 1.15 | 1.22 | 1282 | 1282 | 1429 | 26 |
| 2846 | 2960 | 12,215 | 42.1 | 47.1 | 169.9 | 2810 | 2722 | 12,833 | 1.09 | 1.02 | 1.16 | 1727 | 1498 | 1955 | 27 |
| 2687 | 2794 | 11,675 | 41.5 | 46.4 | 169.3 | 2645 | 2557 | 12,227 | 1.07 | .99 | 1.14 | 1677 | 1450 | 1898 | 28 |
| 2621 | 2731 | 11,435 | 41.1 | 46.1 | 168.4 | 2500 | 2422 | 11,636 | 1.03 | .96 | 1.10 | 1633 | 1411 | 1849 | 29 |
| 2476 | 2580 | 10,803 | 40.4 | 45.3 | 165.7 | 2350 | 2276 | 10,908 | 1.03 | .96 | 1.10 | 1581 | 1366 | 1790 | 30 |
| 2309 | 2401 | 10,033 | 39.5 | 44.2 | 161.1 | 2230 | 2156 | 10,311 | 1.06 | .98 | 1.13 | 1536 | 1328 | 1739 | 31 |
| 2200 | 2292 | 9,500 | 38.0 | 42.7 | 154.6 | 2015 | 1947 | 9,232 | 1.02 | .95 | 1.09 | 1489 | 1281 | 1677 | 32 |
| 1795 | 1870 | 7,783 | 34.7 | 39.1 | 142.1 | 1660 | 1603 | 7,631 | 1.04 | .96 | 1.10 | 1405 | 1206 | 1579 | 33 |
| 3812 | 3972 | 12,926 | 53.0 | 57.8 | 170.3 | 3400 | 3388 | 12,174 | 1.23 | 1.18 | 1.30 | 1695 | 1550 | 1890 | 34 |
| 3743 | 3885 | 12,674 | 52.8 | 57.3 | 169.0 | 3215 | 3194 | 11,516 | 1.19 | 1.14 | 1.26 | 1646 | 1508 | 1842 | 35 |
| 3601 | 3745 | 12,193 | 52.4 | 56.9 | 167.7 | 3025 | 3015 | 10,845 | 1.18 | 1.13 | 1.25 | 1591 | 1461 | 1784 | 36 |
| 3429 | 3566 | 11,645 | 51.6 | 56.1 | 165.6 | 2800 | 2787 | 10,059 | 1.16 | 1.11 | 1.23 | 1546 | 1417 | 1730 | 37 |
| 3234 | 3363 | 10,915 | 50.7 | 55.1 | 161.7 | 2620 | 2611 | 9,366 | 1.18 | 1.13 | 1.25 | 1494 | 1372 | 1675 | 38 |
| 3146 | 3278 | 10,633 | 50.2 | 53.9 | 158.6 | 2440 | 2513 | 8,998 | 1.16 | 1.12 | 1.24 | 1436 | 1347 | 1641 | 39 |
| 2871 | 2980 | 9,721 | 48.1 | 51.7 | 152.5 | 2240 | 2246 | 8,099 | 1.16 | 1.12 | 1.24 | 1380 | 1288 | 1575 | 40 |
| 2664 | 2757 | 8,948 | 46.3 | 49.5 | 145.5 | 2010 | 2012 | 7,212 | 1.15 | 1.11 | 1.23 | 1330 | 1245 | 1518 | 41 |
| 5948 | 6186 | 13,972 | 76.5 | 79.5 | 171.1 | 4520 | 4710 | 11,160 | 1.24 | 1.23 | 1.30 | 1640 | 1648 | 1812 | 42 |
| 5792 | 6035 | 13,617 | 76.1 | 79.1 | 170.2 | 4265 | 4454 | 10,540 | 1.22 | 1.22 | 1.28 | 1594 | 1602 | 1761 | 43 |
| 5624 | 5821 | 13,166 | 75.7 | 78.2 | 168.7 | 4005 | 4153 | 9,853 | 1.19 | 1.20 | 1.26 | 1540 | 1548 | 1702 | 44 |
| 5358 | 5594 | 12,613 | 73.8 | 76.7 | 165.1 | 3735 | 3915 | 9,249 | 1.19 | 1.19 | 1.25 | 1493 | 1505 | 1653 | 45 |
| 5122 | 5317 | 11,975 | 72.4 | 74.9 | 160.9 | 3500 | 3648 | 8,609 | 1.19 | 1.19 | 1.25 | 1446 | 1458 | 1601 | 46 |
| 4794 | 5015 | 11,136 | 70.0 | 73.1 | 155.1 | 3260 | 3417 | 7,945 | 1.23 | 1.23 | 1.28 | 1398 | 1405 | 1538 | 47 |
| 4051 | 4258 | 9,463 | 63.8 | 66.9 | 142.1 | 2570 | 2706 | 6,298 | 1.22 | 1.22 | 1.28 | 1290 | 1296 | 1419 | 48 |
| 1541 | 1647 | 11,129 | 23.9 | 27.5 | 161.9 | 1535 | 1523 | 11,794 | 1.08 | 1.00 | 1.15 | 1666 | 1436 | 1886 | 49 |
| 1465 | 1562 | 10,438 | 23.4 | 26.8 | 156.5 | 1465 | 1452 | 11,094 | 1.12 | 1.04 | 1.19 | 1616 | 1396 | 1826 | 50 |
| 1496 | 1605 | 10,916 | 23.5 | 27.0 | 160.2 | 1450 | 1450 | 11,310 | 1.03 | .96 | 1.10 | 1598 | 1386 | 1827 | 51 |
| 1387 | 1505 | 10,156 | 22.6 | 26.3 | 154.9 | 1320 | 1336 | 10,331 | 1.04 | .97 | 1.11 | 1540 | 1339 | 1760 | 52 |
| 1262 | 1354 | 9,114 | 21.8 | 25.1 | 147.2 | 1195 | 1199 | 9,244 | 1.05 | .98 | 1.12 | 1480 | 1292 | 1698 | 53 |
| 1111 | 1188 | 8,051 | 20.8 | 23.9 | 141.0 | 1070 | 1065 | 8,276 | 1.05 | .98 | 1.12 | 1423 | 1232 | 1619 | 54 |
| 2465 | 2635 | 13,410 | 33.5 | 36.9 | 170.5 | 2240 | 2325 | 13,029 | 1.27 | 1.23 | 1.36 | 1706 | 1608 | 1950 | 55 |
| 2405 | 2564 | 13,016 | 33.2 | 36.5 | 168.5 | 2080 | 2152 | 12,020 | 1.22 | 1.18 | 1.30 | 1656 | 1561 | 1889 | 56 |
| 2302 | 2454 | 12,458 | 32.6 | 35.8 | 165.2 | 1955 | 2025 | 11,311 | 1.21 | 1.17 | 1.29 | 1573 | 1517 | 1836 | 57 |
| 2207 | 2353 | 11,882 | 32.0 | 35.1 | 161.1 | 1830 | 1896 | 10,531 | 1.19 | 1.16 | 1.28 | 1573 | 1486 | 1798 | 58 |
| 1670 | 1899 | 13,385 | 21.8 | 24.9 | 163.3 | 1447 | 1637 | 12,431 | 1.29 | 1.29 | 1.39 | 1676 | 1659 | 1926 | 59 |
| 1655 | 1870 | 13,018 | 21.5 | 24.4 | 157.8 | 1323 | 1489 | 11,154 | 1.20 | 1.19 | 1.28 | 1615 | 1603 | 1856 | 60 |
| 1475 | 1667 | 11,689 | 20.7 | 23.6 | 153.4 | 1205 | 1355 | 10,239 | 1.27 | 1.26 | 1.36 | 1551 | 1535 | 1782 | 61 |
| 1392 | 1555 | 10,949 | 19.9 | 22.4 | 146.5 | 1072 | 1192 | 9,038 | 1.21 | 1.20 | 1.29 | 1487 | 1472 | 1709 | 62 |
| 1263 | 1402 | 9,862 | 19.6 | 21.8 | 142.6 | 969 | 1070 | 8,113 | 1.26 | 1.26 | 1.35 | 1430 | 1416 | 1643 | 63 |
| 2680 | 2975 | 15,244 | 32.2 | 34.3 | 170.7 | 2190 | 2533 | 13,367 | 1.33 | 1.39 | 1.43 | 1717 | 1865 | 1976 | 64 |
| 2184 | 2483 | 12,661 | 29.2 | 31.8 | 157.9 | 1585 | 1882 | 9,861 | 1.28 | 1.33 | 1.37 | ---- | ---- | ---- | 65 |
| 2169 | 2438 | 12,175 | 28.9 | 31.1 | 151.6 | 1428 | 1677 | 8,582 | 1.17 | 1.22 | 1.25 | 1449 | 1582 | 1662 | 66 |
| 2019 | 2269 | 11,272 | 27.6 | 29.7 | 143.7 | 1270 | 1493 | 7,593 | 1.14 | 1.19 | 1.22 | 1396 | 1529 | 1601 | 67 |

NACA

TABLE I. - Continued.　PERFORMANCE

(c) Exhaust-nozzle

| Run number | Altitude, H, ft | Ram pressure ratio, $\frac{P_1}{P_0}$ | Flight Mach number, $M_0$ | Tunnel static pressure, $P_0$, lb sq ft abs | Equivalent ambient air temperature, $t_0$, °R | Engine-inlet indicated temperature, $T_1$, °R | Reynolds number index, $\frac{\delta_T}{\varphi_T\sqrt{\theta_T}}$ | N, rpm | Adjusted, $\frac{N}{\sqrt{\theta_a}}$, rpm | Corrected, $\frac{N}{\sqrt{\theta_T}}$, rpm | Engine total pressure ratio, $\frac{P_4}{P_1}$ | Engine total temperature ratio, $\frac{T_6}{T_1}$ | $F_n$, lb | Adjusted, $\frac{F_n}{\delta_a}$, lb | Corrected, $\frac{F_n}{\delta_T}$, lb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,000 | 1.014 | 0.141 | 1683 | 521 | 523 | 0.789 | 6215 | 6076 | 6191 | 2.214 | 3.038 | 6979 | 7028 | 8,654 |
| 2 | | 1.014 | .141 | 1686 | 524 | 526 | .790 | 6093 | 5940 | 6052 | 2.158 | 2.949 | 6691 | 6724 | 8,277 |
| 3 | | 1.014 | .141 | 1687 | 524 | 526 | .790 | 5971 | 5821 | 5931 | 2.085 | 2.880 | 6328 | 6360 | 7,828 |
| 4 | | 1.016 | .152 | 1687 | 525 | 527 | .788 | 5849 | 5697 | 5805 | 2.011 | 2.786 | 5805 | 5834 | 7,169 |
| 5 | | ----- | ----- | 1687 | --- | 527 | ----- | 5727 | ---- | 5683 | ----- | 2.708 | ---- | ---- | ------ |
| 6 | | 1.017 | .155 | 1688 | 522 | 525 | .790 | 5606 | 5475 | 5574 | 1.847 | 2.657 | 4842 | 4861 | 5,970 |
| 7 | | 1.021 | .173 | 1691 | 522 | 525 | .797 | 5483 | 5356 | 5453 | 1.745 | 2.564 | 4270 | 4279 | 5,231 |
| 8 | | 1.023 | .180 | 1684 | 522 | 525 | .795 | 5362 | 5237 | 5331 | 1.672 | 2.510 | 3885 | 3912 | 4,775 |
| 9 | | 1.026 | .192 | 1686 | 521 | 525 | .798 | 5240 | 5123 | 5210 | 1.596 | 2.438 | 3373 | 3390 | 4,129 |
| 10 | 15,000 | 1.017 | 0.155 | 1181 | 493 | 495 | 0.598 | 6215 | 6036 | 6364 | 2.306 | 3.200 | 5286 | 5339 | 9,314 |
| 11 | | 1.019 | .152 | 1184 | 492 | 495 | .601 | 6093 | 5924 | 6239 | 2.264 | 3.123 | 5144 | 5185 | 9,017 |
| 12 | | 1.016 | .164 | 1185 | 493 | 495 | .600 | 6093 | 5918 | 6239 | 2.270 | 3.103 | 5136 | 5172 | 9,024 |
| 13 | | 1.017 | .155 | 1185 | 493 | 495 | .600 | 5971 | 5799 | 6114 | 2.213 | 3.014 | 4909 | 4943 | 8,620 |
| 14 | | 1.020 | .169 | 1185 | 492 | 495 | .601 | 5849 | 5686 | 5989 | 2.145 | 2.943 | 4645 | 4678 | 8,129 |
| 15 | | 1.021 | .173 | 1185 | 492 | 495 | .601 | 5727 | 5568 | 5864 | 2.067 | 2.865 | 4294 | 4324 | 7,510 |
| 16 | | 1.019 | .164 | 1187 | 492 | 495 | .601 | 5606 | 5450 | 5741 | 1.988 | 2.786 | 3941 | 3961 | 6,893 |
| 17 | 25,000 | 1.014 | 0.141 | 765 | 468 | 470 | 0.418 | 6093 | 5840 | 6404 | 2.380 | 3.306 | 3611 | 3705 | 9,847 |
| 18 | | 1.018 | .160 | 764 | 468 | 470 | .419 | 5971 | 5723 | 6276 | 2.326 | 3.211 | 3432 | 3525 | 9,335 |
| 19 | | 1.016 | .152 | 764 | 468 | 470 | .418 | 5849 | 5606 | 6147 | 2.264 | 3.115 | 3295 | 3381 | 8,972 |
| 20 | | 1.016 | .152 | 764 | 468 | 470 | .418 | 5727 | 5489 | 6019 | 2.202 | 3.026 | 3112 | 3193 | 8,474 |
| 21 | | 1.018 | .160 | 765 | 468 | 470 | .419 | 5606 | 5373 | 5892 | 2.131 | 2.951 | 2898 | 2973 | 7,871 |
| 22 | | 1.298 | .622 | 762 | 458 | 493 | .495 | 6215 | 6022 | 6377 | 2.304 | 3.221 | 3699 | 3810 | 7,916 |
| 23 | | 1.294 | .619 | 766 | 457 | 492 | .496 | 6093 | 5910 | 6258 | 2.272 | 3.124 | 3543 | 3632 | 7,564 |
| 24 | | 1.296 | .621 | 763 | 458 | 493 | .495 | 5971 | 5786 | 6126 | 2.200 | 3.053 | 3366 | 3464 | 7,203 |
| 25 | | 1.298 | .622 | 762 | 458 | 493 | .495 | 5849 | 5668 | 6001 | 2.126 | 2.945 | 3151 | 3245 | 6,743 |
| 26 | | 1.301 | .625 | 763 | 458 | 494 | .494 | 5727 | 5549 | 5870 | 2.046 | 2.858 | ---- | ---- | 5,656 |
| 27 | | 1.301 | .625 | 762 | 458 | 494 | .494 | 5606 | 5432 | 5746 | 1.955 | 2.761 | 2649 | 2728 | 5,656 |
| 28 | | 1.300 | .624 | 769 | 430 | 463 | .550 | 5484 | 5484 | 5808 | 1.993 | 2.795 | 2829 | 2888 | 5,986 |
| 29 | | 1.316 | .639 | 767 | 429 | 464 | .551 | 5240 | 5245 | 5544 | 1.776 | 2.610 | 2246 | 2298 | 4,710 |
| 30 | 35,000 | 1.010 | 0.118 | 477 | 457 | 458 | 0.268 | 6215 | 5772 | 6613 | 2.539 | 3.633 | 2480 | 2589 | 10,887 |
| 31 | | 1.008 | .107 | 478 | 457 | 458 | .268 | 6093 | 5658 | 6483 | 2.494 | 3.557 | 2400 | 2501 | 10,536 |
| 32 | | 1.010 | .118 | 479 | 458 | 459 | .269 | 5971 | 5540 | 6347 | 2.459 | 3.438 | 2331 | 2424 | 10,191 |
| 33 | | 1.013 | .136 | 479 | 456 | 458 | .270 | 5849 | 5435 | 6223 | 2.390 | 3.330 | 2212 | 2300 | 9,651 |
| 34 | | 1.008 | .107 | 479 | 458 | 459 | .269 | 5727 | 5312 | 6088 | 2.337 | 3.231 | 2114 | 2199 | 9,261 |
| 35 | | 1.027 | .195 | 477 | 454 | 457 | .272 | 5606 | 5225 | 5976 | 2.243 | 3.133 | 1864 | 2209 | 8,049 |
| 36 | | 1.017 | .155 | 479 | 458 | 460 | .269 | 5484 | 5086 | 5824 | 2.117 | 3.028 | 1762 | 1832 | 7,656 |
| 37 | | 1.023 | .180 | 479 | 459 | 462 | .270 | 5240 | 4855 | 5554 | 1.900 | 2.851 | 1464 | 1523 | 6,322 |
| 38 | | 1.301 | .625 | 481 | 429 | 463 | .342 | 6215 | 5956 | 6582 | 2.441 | 3.503 | 2657 | 2750 | 8,981 |
| 39 | | 1.305 | .629 | 479 | 429 | 463 | .342 | 6093 | 5839 | 6452 | 2.406 | 3.408 | 2527 | 2628 | 8,556 |
| 40 | | 1.305 | .629 | 478 | 429 | 463 | .341 | 5971 | 5722 | 6323 | 2.349 | 3.296 | 2407 | 2508 | 8,162 |
| 41 | | ----- | ----- | 478 | --- | 463 | ----- | 5849 | ---- | 6194 | ----- | ----- | ---- | ---- | ------ |
| 42 | | 1.310 | .634 | 478 | 429 | 463 | .342 | 5727 | 5488 | 6065 | 2.225 | 3.089 | 2173 | 2264 | 7,345 |
| 43 | | 1.308 | .632 | 478 | 429 | 463 | .342 | 5606 | 5372 | 5937 | 2.149 | 3.009 | 1998 | 2082 | 6,765 |
| 44 | | 1.322 | .645 | 481 | 420 | 455 | .357 | 5484 | 5312 | 5857 | 2.099 | 2.941 | 1943 | 2011 | 6,464 |
| 45 | | 1.317 | .640 | 480 | 421 | 455 | .357 | 5362 | 5187 | 5727 | 1.975 | 2.831 | 1741 | 1807 | 5,829 |
| 46 | | 1.326 | .648 | 478 | 420 | 455 | .357 | 5240 | 5075 | 5596 | 1.858 | 2.734 | 1550 | 1615 | 5,174 |
| 47 | | 1.872 | .991 | 478 | 392 | 469 | .482 | 6215 | 6227 | 6538 | 2.362 | 3.369 | 3364 | 3505 | 7,952 |
| 48 | | 1.866 | .988 | 479 | 392 | 469 | .482 | 6093 | 6105 | 6410 | 2.315 | 3.275 | 3351 | 3485 | 7,932 |
| 49 | | 1.887 | .998 | 479 | 390 | 468 | .490 | 5971 | 6001 | 6287 | 2.277 | 3.173 | 3110 | 3234 | 7,281 |
| 50 | | 1.862 | .986 | 477 | 392 | 468 | .480 | 5849 | 5861 | 6159 | 2.218 | 3.077 | 2942 | 3071 | 7,011 |
| 51 | | 1.864 | .987 | 477 | 392 | 468 | .480 | 5727 | 5738 | 6031 | 2.150 | 2.981 | 2791 | 2914 | 6,643 |
| 52 | | 1.891 | 1.000 | 478 | 390 | 468 | .490 | 5606 | 5634 | 5903 | 2.061 | 2.889 | 2642 | 2753 | 6,185 |
| 53 | | 1.895 | 1.001 | 477 | 392 | 471 | .481 | 5484 | 5495 | 5758 | 1.959 | 2.786 | 2396 | 2501 | 5,609 |
| 54 | | 1.897 | 1.002 | 476 | 392 | 471 | .481 | 5240 | 5250 | 5502 | 1.729 | 2.569 | 1876 | 1962 | 4,395 |
| 55 | | 1.889 | .999 | 477 | 518 | 621 | .339 | 6215 | 5420 | 5682 | 1.896 | 2.787 | 2287 | 2388 | 5,372 |
| 56 | | 1.881 | .995 | 480 | 507 | 607 | .350 | 6093 | 5371 | 5634 | 1.784 | 2.720 | 2035 | 2112 | 4,768 |
| 57 | | 1.901 | 1.004 | 477 | 512 | 615 | .346 | 5971 | 5238 | 5485 | 1.705 | 2.582 | 1796 | 1875 | 4,190 |
| 58 | | 1.883 | .996 | 478 | 510 | 611 | .346 | 5849 | 5141 | 5390 | 1.622 | 2.520 | 1546 | 1611 | 3,635 |
| 59 | | 1.890 | 1.000 | 480 | 508 | 609 | .350 | 5849 | 5151 | 5399 | 1.603 | 2.504 | 1661 | 1724 | 3,875 |
| 60 | | 1.893 | 1.000 | 477 | 516 | 619 | .342 | 5727 | 5004 | 5244 | 1.503 | 2.415 | 1310 | 1368 | 3,069 |
| 61 | | 1.908 | 1.007 | 479 | 517 | 622 | .343 | 5606 | 4894 | 5121 | 1.381 | 2.291 | 1080 | 1123 | 2,500 |
| 62 | 45,000 | 1.031 | 0.210 | 287 | 450 | 454 | 0.169 | 6093 | 5694 | 6513 | 2.618 | 3.733 | 1515 | 1626 | 10,831 |
| 63 | | 1.031 | .210 | 289 | 449 | 453 | .169 | 5971 | 5586 | 6395 | 2.540 | 3.667 | 1495 | 1594 | 10,616 |
| 64 | | 1.024 | .184 | 290 | 451 | 454 | .169 | 5849 | 5460 | 6253 | 2.505 | 3.544 | 1430 | 1519 | 10,189 |
| 65 | | 1.028 | .199 | 287 | 451 | 455 | .169 | 5727 | 5346 | 6116 | 2.397 | 3.440 | 1358 | 1457 | 9,741 |
| 66 | | 1.024 | .184 | 289 | 450 | 453 | .169 | 5606 | 5239 | 6004 | 2.307 | 3.327 | 1302 | 1388 | 9,308 |
| 67 | | 1.021 | .173 | 289 | 451 | 454 | .167 | 5484 | 5119 | 5862 | 2.224 | 3.200 | 1148 | 1224 | 8,235 |
| 68 | | 1.010 | .118 | 287 | 453 | 454 | .167 | 5362 | 4994 | 5732 | 2.097 | 3.090 | 1076 | 1155 | 7,852 |
| 69 | | 1.010 | .118 | 289 | 453 | 454 | .167 | 5240 | 4881 | 5602 | 1.997 | 2.976 | 945 | 1007 | 6,848 |
| 70 | | 1.355 | .674 | 287 | 417 | 455 | .220 | 6215 | 6034 | 6638 | 2.584 | 3.736 | 1743 | 1870 | 9,482 |
| 71 | | 1.349 | .669 | 289 | 419 | 456 | .220 | 6093 | 5901 | 6501 | 2.528 | 3.636 | 1690 | 1802 | 9,170 |
| 72 | | 1.349 | .669 | 289 | 417 | 454 | .220 | 6093 | 5915 | 6513 | 2.521 | 3.623 | 1679 | 1790 | 9,110 |
| 73 | | 1.348 | .668 | 290 | 417 | 454 | .220 | 5971 | 5797 | 6383 | 2.471 | 3.529 | 1616 | 1716 | 8,746 |
| 74 | | 1.349 | .669 | 289 | 417 | 454 | .220 | 5849 | 5678 | 6253 | 2.390 | 3.414 | 1554 | 1657 | 8,432 |
| 75 | | 1.347 | .667 | 288 | 417 | 454 | .220 | 5727 | 5560 | 6122 | 2.322 | 3.297 | 1442 | 1541 | 7,865 |
| 76 | | 1.348 | .668 | 290 | 417 | 454 | .220 | 5606 | 5442 | 5993 | 2.225 | 3.194 | 1350 | 1434 | 7,306 |
| 77 | 55,000 | 1.018 | 0.160 | 167 | 452 | 454 | 0.095 | 5849 | 5454 | 6253 | 2.582 | 3.714 | 899 | 1028 | 11,193 |
| 78 | | 1.018 | .160 | 166 | 453 | 455 | .095 | 5727 | 5334 | 6116 | 2.473 | 3.664 | 797 | 917 | 9,978 |
| 79 | | 1.024 | .184 | 164 | 452 | 455 | .095 | 5727 | 5340 | 6116 | 2.464 | 3.624 | 814 | 948 | 10,256 |
| 80 | | 1.018 | .160 | 164 | 453 | 455 | .095 | 5606 | 5221 | 5987 | 2.359 | 3.547 | 742 | 864 | 9,401 |
| 81 | | 1.561 | .824 | 164 | 398 | 452 | .146 | 6093 | 6055 | 6526 | 2.625 | 3.757 | 1165 | 1357 | 9,630 |
| 82 | | 1.576 | .833 | 170 | 397 | 452 | .154 | 5971 | 5941 | 6395 | 2.522 | 3.699 | 1158 | 1302 | 9,144 |
| 83 | | 1.541 | .812 | 170 | 399 | 452 | .151 | 5849 | 5805 | 6264 | 2.557 | 3.593 | 1102 | 1239 | 8,900 |
| 84 | | 1.556 | .821 | 171 | 399 | 453 | .153 | 5727 | 5684 | 6134 | 2.447 | 3.457 | 1024 | 1144 | 8,146 |
| 85 | | 1.546 | .815 | 174 | 401 | 454 | .154 | 5606 | 5549 | 5993 | 2.279 | 3.350 | 1002 | 1100 | 7,882 |
| 86 | | 1.567 | .828 | 171 | 398 | 452 | .152 | 5484 | 5449 | 5879 | 2.108 | 3.179 | 905 | 1011 | 7,146 |
| 87 | | 1.561 | .824 | 173 | 397 | 451 | .152 | 5362 | 5335 | 5753 | 2.037 | 3.111 | 817 | 902 | 6,403 |
| 88 | | 1.552 | .819 | 174 | 399 | 453 | .153 | 5240 | 5201 | 5612 | 1.863 | 2.974 | 702 | 771 | 5,502 |

DATA FOR YJ71-A-7 TURBOJET ENGINE

area, 2.86 square feet

| Jet thrust $F_j$, lb | Adjusted, $\dfrac{F_j}{\delta_a}$, lb | Corrected, $\dfrac{F_j}{\delta_T}$, lb | $W_a$, lb/sec | Adjusted, $\dfrac{W_a\sqrt{\theta_a}}{\delta_a}$, lb/sec | Corrected, $\dfrac{W_a\sqrt{\theta_T}}{\delta_T}$, lb/sec | $W_f$, lb/hr | Adjusted, $\dfrac{W_f}{\delta_a\sqrt{\theta_a}}$, lb/hr | Corrected, $\dfrac{W_f}{\delta_T\sqrt{\theta_T}}$, lb/hr | $\dfrac{W_f}{F_n}$, lb/hr/lb thrust | Adjusted, $\dfrac{W_f}{F_n\sqrt{\theta_a}}$, lb/hr/lb thrust | Corrected, $\dfrac{W_f}{F_n\sqrt{\theta_T}}$, lb/hr/lb thrust | $T_6$, °R | Adjusted, $\dfrac{T_6}{\theta_a}$, °R | Corrected, $\dfrac{T_6}{\theta_T}$, °R | Run number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7647 | 7701 | 9,482 | 135.7 | 139.8 | 169.0 | 7220 | 7108 | 8,919 | 1.04 | 1.01 | 1.03 | 1589 | 1519 | 1577 | 1 |
| 7350 | 7387 | 9,092 | 133.6 | 137.8 | 166.2 | 6770 | 6633 | 8,319 | 1.01 | .98 | 1.01 | 1551 | 1474 | 1530 | 2 |
| 6972 | 7007 | 8,624 | 130.7 | 134.7 | 162.6 | 6375 | 6246 | 7,833 | 1.01 | .98 | 1.00 | 1515 | 1440 | 1495 | 3 |
| 6477 | 6509 | 7,999 | 126.8 | 130.9 | 157.8 | 5890 | 5766 | 7,219 | 1.02 | .99 | 1.01 | 1468 | 1393 | 1446 | 4 |
| ---- | ---- | ------ | ----- | ----- | ----- | 5400 | ---- | ------ | ---- | ---- | ---- | 1427 | ---- | 1405 | 5 |
| 5482 | 5504 | 6,759 | 118.6 | 122.0 | 147.1 | 5030 | 4933 | 6,166 | 1.04 | 1.02 | 1.03 | 1395 | 1331 | 1379 | 6 |
| 4972 | 4982 | 6,091 | 116.4 | 119.4 | 143.4 | 4490 | 4394 | 5,468 | 1.05 | 1.03 | 1.05 | 1346 | 1284 | 1331 | 7 |
| 4564 | 4596 | 5,609 | 108.2 | 111.6 | 133.8 | 4105 | 4037 | 5,017 | 1.06 | 1.03 | 1.05 | 1318 | 1257 | 1303 | 8 |
| 4068 | 4088 | 4,979 | 103.9 | 106.8 | 127.9 | 3750 | 3684 | 4,564 | 1.11 | 1.09 | 1.11 | 1280 | 1224 | 1265 | 9 |
| 5804 | 5862 | 10,227 | 98.8 | 102.8 | 170.1 | 5390 | 5287 | 9,724 | 1.02 | 0.99 | 1.04 | 1584 | 1494 | 1662 | 10 |
| 5693 | 5739 | 9,980 | 98.9 | 102.5 | 169.3 | 5150 | 5047 | 9,245 | 1.00 | .97 | 1.03 | 1546 | 1461 | 1622 | 11 |
| 5642 | 5681 | 9,913 | 98.7 | 102.3 | 169.4 | 5125 | 5012 | 9,221 | 1.00 | .97 | 1.02 | 1536 | 1449 | 1611 | 12 |
| 5420 | 5458 | 9,518 | 97.5 | 101.2 | 167.3 | 4825 | 4719 | 8,676 | .98 | .95 | 1.01 | 1492 | 1407 | 1565 | 13 |
| 5192 | 5228 | 9,086 | 95.9 | 99.4 | 164.0 | 4530 | 4435 | 8,118 | .97 | .95 | 1.00 | 1457 | 1377 | 1528 | 14 |
| 4842 | 4876 | 8,469 | 93.7 | 97.0 | 160.0 | 4215 | 4127 | 7,549 | .98 | .95 | 1.01 | 1418 | 1340 | 1487 | 15 |
| 4444 | 4466 | 7,773 | 90.6 | 93.6 | 154.7 | 3900 | 3811 | 6,986 | .99 | .96 | 1.01 | 1379 | 1303 | 1447 | 16 |
| 3918 | 4020 | 10,684 | 65.8 | 70.4 | 170.8 | 3630 | 3569 | 10,404 | 1.01 | 0.96 | 1.06 | 1554 | 1428 | 1717 | 17 |
| 3776 | 3878 | 10,271 | 65.4 | 70.1 | 169.3 | 3430 | 3377 | 9,806 | 1.00 | .96 | 1.05 | 1509 | 1386 | 1667 | 18 |
| 3617 | 3711 | 9,849 | 64.4 | 68.9 | 167.0 | 3285 | 3231 | 9,403 | 1.00 | .96 | 1.05 | 1464 | 1345 | 1618 | 19 |
| 3429 | 3518 | 9,337 | 63.4 | 67.8 | 164.3 | 3045 | 2995 | 8,714 | .98 | .94 | 1.03 | 1427 | 1311 | 1577 | 20 |
| 3225 | 3309 | 8,759 | 62.1 | 66.5 | 160.6 | 2865 | 2817 | 8,178 | .99 | .95 | 1.04 | 1387 | 1274 | 1533 | 21 |
| 5359 | 5520 | 11,468 | 81.8 | 86.9 | 170.7 | 4480 | 4471 | 9,835 | 1.21 | 1.17 | 1.24 | 1588 | 1491 | 1672 | 22 |
| 5192 | 5322 | 11,085 | 81.8 | 86.5 | 170.2 | 4280 | 4256 | 9,385 | 1.21 | 1.17 | 1.24 | 1537 | 1446 | 1622 | 23 |
| 4997 | 5142 | 10,694 | 80.6 | 85.6 | 168.2 | 3985 | 3973 | 8,750 | 1.18 | 1.15 | 1.22 | 1505 | 1413 | 1585 | 24 |
| 4751 | 4894 | 10,167 | 78.9 | 83.8 | 164.5 | 3720 | 3713 | 8,168 | 1.18 | 1.14 | 1.21 | 1452 | 1363 | 1529 | 25 |
| ---- | ---- | ------ | 77.0 | 81.7 | 160.0 | 3465 | 3955 | 7,569 | ---- | ---- | ---- | 1412 | 1326 | 1484 | 26 |
| 4166 | 4291 | 8,894 | 74.4 | 79.1 | 155.0 | 3170 | 3164 | 6,937 | 1.20 | 1.16 | 1.23 | 1364 | 1281 | 1434 | 27 |
| 4383 | 4475 | 9,274 | 78.8 | 80.5 | 157.5 | 3280 | 3349 | 7,351 | 1.16 | 1.16 | 1.23 | 1294 | 1294 | 1451 | 28 |
| 3721 | 3807 | 7,803 | 73.2 | 74.8 | 145.1 | 2625 | 2688 | 5,823 | 1.17 | 1.17 | 1.24 | 1211 | 1213 | 1355 | 29 |
| 2640 | 2756 | 11,590 | 41.5 | 46.7 | 171.2 | 2655 | 2575 | 12,402 | 1.07 | 0.99 | 1.14 | 1664 | 1436 | 1884 | 30 |
| 2545 | 2652 | 11,173 | 41.4 | 46.5 | 170.9 | 2545 | 2462 | 11,888 | 1.06 | .98 | 1.13 | 1629 | 1405 | 1844 | 31 |
| 2490 | 2590 | 10,886 | 41.3 | 46.3 | 169.7 | 2390 | 2306 | 11,109 | 1.02 | .95 | 1.09 | 1578 | 1358 | 1783 | 32 |
| 2394 | 2490 | 10,445 | 41.2 | 46.1 | 169.0 | 2275 | 2199 | 10,563 | 1.03 | .96 | 1.09 | 1525 | 1317 | 1726 | 33 |
| 2255 | 2345 | 9,879 | 40.3 | 45.1 | 165.9 | 2110 | 2035 | 9,827 | 1.00 | .93 | 1.06 | 1483 | 1276 | 1676 | 34 |
| 2116 | 2209 | 9,137 | 39.8 | 44.6 | 161.3 | 1960 | 1907 | 9,020 | 1.05 | .98 | 1.12 | 1432 | 1244 | 1627 | 35 |
| 1956 | 2034 | 8,499 | 38.4 | 43.1 | 157.1 | 1803 | 1739 | 8,321 | 1.02 | .95 | 1.09 | 1393 | 1198 | 1571 | 36 |
| 1670 | 1737 | 7,211 | 35.0 | 39.3 | 142.6 | 1486 | 1452 | 6,801 | 1.01 | .94 | 1.08 | 1317 | 1131 | 1480 | 37 |
| 3710 | 3840 | 12,540 | 53.3 | 57.7 | 170.3 | 3170 | 3144 | 11,347 | 1.19 | 1.14 | 1.26 | 1622 | 1490 | 1818 | 38 |
| 3582 | 3725 | 12,129 | 53.2 | 57.7 | 170.0 | 3045 | 3035 | 10,920 | 1.20 | 1.15 | 1.28 | 1578 | 1449 | 1769 | 39 |
| 3453 | 3598 | 11,709 | 52.7 | 57.4 | 168.9 | 2875 | 2871 | 10,326 | 1.19 | 1.14 | 1.26 | 1526 | 1401 | 1711 | 40 |
| ---- | ---- | ------ | ----- | ----- | ----- | 2700 | ---- | ------ | ---- | ---- | ---- | ---- | ---- | ----- | 41 |
| 3208 | 3343 | 10,843 | 51.7 | 56.3 | 165.1 | 2525 | 2522 | 9,038 | 1.16 | 1.11 | 1.23 | 1430 | 1313 | 1603 | 42 |
| 3008 | 3134 | 10,185 | 50.7 | 55.1 | 162.1 | 2350 | 2347 | 8,428 | 1.18 | 1.13 | 1.24 | 1393 | 1279 | 1562 | 43 |
| 2968 | 3072 | 9,875 | 50.9 | 54.4 | 158.6 | 2260 | 2266 | 8,031 | 1.16 | 1.13 | 1.24 | 1338 | 1255 | 1527 | 44 |
| 2715 | 2818 | 9,090 | 48.7 | 52.3 | 152.7 | 2010 | 2018 | 7,188 | 1.15 | 1.12 | 1.23 | 1288 | 1205 | 1470 | 45 |
| 2497 | 2602 | 8,335 | 46.8 | 50.3 | 146.3 | 1827 | 1827 | 6,452 | 1.17 | 1.13 | 1.25 | 1244 | 1167 | 1419 | 46 |
| 5652 | 5889 | 13,361 | 76.5 | 79.6 | 172.0 | 4255 | 4443 | 10,581 | 1.26 | 1.27 | 1.33 | 1580 | 1588 | 1749 | 47 |
| 5617 | 5842 | 13,295 | 76.0 | 78.9 | 171.1 | 4030 | 4200 | 10,036 | 1.20 | 1.20 | 1.27 | 1536 | 1544 | 1700 | 48 |
| 5406 | 5622 | 12,655 | 76.5 | 79.1 | 170.0 | 3865 | 4039 | 9,528 | 1.24 | 1.25 | 1.31 | 1485 | 1500 | 1647 | 49 |
| 5161 | 5388 | 12,299 | 74.6 | 77.7 | 168.7 | 3580 | 3145 | 8,984 | 1.22 | 1.22 | 1.28 | 1440 | 1447 | 1597 | 50 |
| 4979 | 5198 | 11,850 | 73.5 | 76.6 | 166.1 | 3360 | 3515 | 8,420 | 1.20 | 1.21 | 1.27 | 1395 | 1402 | 1547 | 51 |
| 4832 | 5035 | 11,312 | 72.8 | 75.5 | 161.9 | 3140 | 3289 | 7,739 | 1.19 | 1.19 | 1.25 | 1352 | 1366 | 1499 | 52 |
| 4503 | 4701 | 10,542 | 69.7 | 72.7 | 155.5 | 2865 | 2997 | 7,042 | 1.20 | 1.20 | 1.26 | 1312 | 1317 | 1447 | 53 |
| 3820 | 3996 | 8,950 | 64.3 | 67.1 | 143.5 | 2285 | 2395 | 5,621 | 1.22 | 1.22 | 1.28 | 1210 | 1216 | 1335 | 54 |
| 4323 | 4513 | 10,155 | 58.8 | 70.4 | 151.1 | 3072 | 3072 | 7,247 | 1.48 | 1.29 | 1.35 | 1731 | 1317 | 1447 | 55 |
| 3989 | 4141 | 9,346 | 57.3 | 67.4 | 145.2 | 3035 | 2777 | 6,574 | 1.49 | 1.31 | 1.38 | 1651 | 1283 | 1412 | 56 |
| 3732 | 3896 | 8,707 | 55.9 | 66.5 | 142.1 | 2755 | 2523 | 5,905 | 1.53 | 1.35 | 1.41 | 1588 | 1222 | 1340 | 57 |
| 3381 | 3523 | 7,949 | 53.5 | 63.5 | 136.5 | 2500 | 2289 | 5,417 | 1.62 | 1.42 | 1.49 | 1540 | 1190 | 1308 | 58 |
| 3504 | 3637 | 8,175 | 53.7 | 63.3 | 135.7 | 2480 | 2267 | 5,340 | 1.49 | 1.31 | 1.38 | 1525 | 1183 | 1299 | 59 |
| 3045 | 3179 | 7,134 | 50.1 | 59.9 | 128.3 | 2190 | 1998 | 4,698 | 1.67 | 1.46 | 1.53 | 1495 | 1142 | 1253 | 60 |
| 2754 | 2864 | 6,376 | 48.0 | 57.1 | 121.6 | 1895 | 1720 | 4,007 | 1.75 | 1.53 | 1.60 | 1425 | 1086 | 1189 | 61 |
| 1687 | 1810 | 12,060 | 25.3 | 29.1 | 169.4 | 1725 | 1730 | 13,183 | 1.14 | 1.06 | 1.22 | 1695 | 1480 | 1937 | 62 |
| 1666 | 1776 | 11,830 | 25.3 | 28.8 | 167.9 | 1630 | 1626 | 12,398 | 1.09 | 1.02 | 1.17 | 1661 | 1454 | 1905 | 63 |
| 1578 | 1676 | 11,243 | 24.9 | 28.3 | 165.1 | 1535 | 1522 | 11,692 | 1.07 | 1.00 | 1.15 | 1609 | 1402 | 1839 | 64 |
| 1514 | 1625 | 10,860 | 24.2 | 27.8 | 162.6 | 1400 | 1402 | 10,724 | 1.03 | .96 | 1.10 | 1565 | 1364 | 1786 | 65 |
| 1443 | 1538 | 10,316 | 23.7 | 27.0 | 158.3 | 1310 | 1305 | 10,030 | 1.01 | .94 | 1.08 | 1507 | 1316 | 1729 | 66 |
| 1277 | 1361 | 9,160 | 23.0 | 26.3 | 154.6 | 1195 | 1190 | 9,160 | 1.04 | .97 | 1.11 | 1453 | 1266 | 1661 | 67 |
| 1159 | 1244 | 8,457 | 21.7 | 25.0 | 148.1 | 1060 | 1059 | 8,268 | .98 | .92 | 1.05 | 1403 | 1217 | 1604 | 68 |
| 1025 | 1093 | 7,428 | 20.9 | 23.9 | 141.8 | 970 | 963 | 7,515 | 1.03 | .96 | 1.10 | 1351 | 1172 | 1544 | 69 |
| 2450 | 2629 | 13,328 | 33.7 | 37.3 | 171.8 | 2285 | 2380 | 13,274 | 1.31 | 1.27 | 1.40 | 1700 | 1602 | 1940 | 70 |
| 2390 | 2548 | 12,968 | 33.6 | 37.0 | 170.8 | 2120 | 2188 | 12,274 | 1.25 | 1.21 | 1.34 | 1658 | 1555 | 1887 | 71 |
| 2379 | 2536 | 12,908 | 33.6 | 36.9 | 170.8 | 2110 | 2183 | 12,241 | 1.26 | 1.22 | 1.34 | 1645 | 1550 | 1880 | 72 |
| 2315 | 2459 | 12,529 | 33.6 | 36.8 | 170.2 | 2000 | 2062 | 11,571 | 1.24 | 1.20 | 1.32 | 1602 | 1510 | 1831 | 73 |
| 2245 | 2393 | 12,181 | 33.2 | 36.5 | 168.6 | 1860 | 1925 | 10,787 | 1.20 | 1.16 | 1.28 | 1550 | 1461 | 1772 | 74 |
| 2115 | 2261 | 11,535 | 32.5 | 35.7 | 165.6 | 1725 | 1791 | 10,057 | 1.20 | 1.16 | 1.28 | 1497 | 1411 | 1711 | 75 |
| 2015 | 2140 | 10,905 | 32.0 | 35.0 | 161.9 | 1610 | 1660 | 9,314 | 1.19 | 1.16 | 1.27 | 1450 | 1366 | 1857 | 76 |
| 972 | 1112 | 12,101 | 14.2 | 17.4 | 165.3 | 993 | 1059 | 13,222 | 1.10 | 1.03 | 1.18 | 1686 | 1466 | 1927 | 77 |
| 868 | 999 | 10,867 | 13.6 | 16.8 | 159.7 | 910 | 976 | 12,169 | 1.14 | 1.06 | 1.22 | 1667 | 1446 | 1902 | 78 |
| 895 | 1043 | 11,277 | 13.6 | 17.0 | 160.8 | 901 | 979 | 12,121 | 1.11 | 1.03 | 1.18 | 1649 | 1434 | 1882 | 79 |
| 811 | 945 | 10,275 | 13.3 | 16.6 | 157.6 | 833 | 904 | 11,276 | 1.12 | 1.05 | 1.20 | 1614 | 1400 | 1842 | 80 |
| 1727 | 2012 | 14,275 | 22.4 | 26.3 | 172.9 | 1512 | 1750 | 13,383 | 1.30 | 1.29 | 1.39 | 1698 | 1677 | 1948 | 81 |
| 1737 | 1952 | 13,715 | 22.9 | 25.8 | 168.5 | 1468 | 1642 | 12,413 | 1.27 | 1.26 | 1.36 | 1672 | 1655 | 1918 | 82 |
| 1653 | 1858 | 13,350 | 22.3 | 25.3 | 168.3 | 1397 | 1559 | 12,082 | 1.27 | 1.26 | 1.36 | 1624 | 1600 | 1863 | 83 |
| 1584 | 1769 | 12,601 | 22.4 | 25.2 | 166.5 | 1295 | 1435 | 11,034 | 1.26 | 1.26 | 1.35 | 1566 | 1543 | 1796 | 84 |
| 1538 | 1689 | 12,098 | 21.6 | 23.7 | 158.6 | 1178 | 1280 | 9,903 | 1.18 | 1.16 | 1.26 | 1521 | 1491 | 1739 | 85 |
| 1430 | 1597 | 11,291 | 20.9 | 23.5 | 153.8 | 1075 | 1193 | 9,096 | 1.19 | 1.18 | 1.27 | 1437 | 1419 | 1651 | 86 |
| 1330 | 1468 | 10,423 | 20.5 | 22.8 | 149.8 | 988 | 1085 | 8,307 | 1.21 | 1.20 | 1.30 | 1403 | 1389 | 1615 | 87 |
| 1189 | 1306 | 9,318 | 19.5 | 21.6 | 143.1 | 873 | 951 | 7,328 | 1.24 | 1.23 | 1.33 | 1347 | 1327 | 1545 | 88 |

NACA

TABLE I. - Continued.  PERFORMANCE

(d) Exhaust-nozzle

| Run number | Altitude, H, ft | Ram pressure ratio, $\frac{P_1}{P_0}$ | Flight Mach number, $M_0$ | Tunnel static pressure, $P_0$, lb/sq ft abs | Equivalent ambient air temperature, $t_0$, °R | Engine-inlet indicated temperature, $T_1$, °R | Reynolds number index, $\frac{\delta_T}{\varphi_T\sqrt{\theta_T}}$ | Engine speed N, rpm | Engine speed Adjusted, $\frac{N}{\sqrt{\theta_a}}$, rpm | Engine speed Corrected, $\frac{N}{\sqrt{\theta_T}}$, rpm | Engine total-pressure ratio, $\frac{P_4}{P_1}$ | Engine total-temperature ratio, $\frac{T_6}{T_1}$ | Net thrust $F_n$, lb | Net thrust Adjusted, $\frac{F_n}{\delta_a}$, lb | Net thrust Corrected, $\frac{F_n}{\delta_T}$, lb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,000 | 1.010 | 0.118 | 1690 | 523 | 524 | 0.803 | 6215 | 6065 | 6185 | 1.986 | 2.773 | 6048 | 6066 | 7,500 |
| 2 | | 1.015 | .147 | 1687 | 525 | 527 | .789 | 6093 | 5935 | 6047 | 1.935 | 2.713 | 5714 | 5743 | 7,063 |
| 3 | | 1.015 | .147 | 1686 | 524 | 526 | .790 | 5971 | 5821 | 5931 | 1.879 | 2.587 | 5377 | 5404 | 6,646 |
| 4 | | 1.015 | .147 | 1685 | 524 | 526 | .790 | 5849 | 5702 | 5810 | 1.815 | 2.559 | 4914 | 4943 | 6,079 |
| 5 | | 1.017 | .155 | 1690 | 524 | 527 | .791 | 5727 | 5583 | 5683 | 1.746 | 2.520 | 4520 | 4534 | 5,569 |
| 6 | | 1.018 | .160 | 1687 | 521 | 524 | .803 | 5606 | 5481 | 5579 | 1.673 | 2.437 | 4109 | 4130 | 5,062 |
| 7 | | 1.022 | .176 | 1685 | 521 | 524 | .812 | 5484 | 5362 | 5458 | 1.596 | 2.382 | 3597 | 3619 | 4,421 |
| 8 | | 1.024 | .184 | 1683 | 520 | 524 | .812 | 5240 | 5128 | 5215 | 1.468 | 2.263 | 2837 | 2857 | 3,484 |
| 9 | 15,000 | 1.017 | 0.155 | 1183 | 492 | 494 | 0.600 | 6215 | 6042 | 6370 | 2.068 | 2.960 | 4536 | 4572 | 7,979 |
| 10 | | 1.017 | .155 | 1186 | 492 | 494 | .600 | 6093 | 5924 | 6245 | 2.032 | 2.866 | 4385 | 4411 | 7,696 |
| 11 | | ----- | ----- | 1185 | --- | 493 | ----- | 5971 | ---- | 6126 | ----- | 2.807 | ---- | ---- | ------ |
| 12 | | 1.019 | .164 | 1186 | 491 | 494 | .600 | 5849 | 5692 | 5995 | 1.929 | 2.717 | 3943 | 3967 | 6,908 |
| 13 | | 1.022 | .176 | 1186 | 492 | 495 | .601 | 5727 | 5568 | 5864 | 1.866 | 2.642 | 3635 | 3657 | 6,347 |
| 14 | | 1.023 | .180 | 1188 | 492 | 495 | .603 | 5606 | 5450 | 5741 | 1.784 | 2.578 | 3335 | 3348 | 5,810 |
| 15 | 25,000 | 1.010 | 0.118 | 765 | 468 | 469 | 0.417 | 6215 | 5957 | 6538 | 2.175 | 3.158 | 3226 | 3310 | 8,830 |
| 16 | | 1.018 | .160 | 765 | 467 | 469 | .420 | 6093 | 5847 | 6410 | 2.119 | 3.047 | 3099 | 3180 | 8,417 |
| 17 | | 1.012 | .130 | 765 | 467 | 469 | .417 | 5971 | 5730 | 6281 | 2.099 | 2.953 | 2986 | 3064 | 8,164 |
| 18 | | 1.018 | .160 | 766 | 467 | 469 | .420 | 5848 | 5613 | 6153 | 2.027 | 2.870 | 2878 | 2950 | 7,808 |
| 19 | | 1.021 | .173 | 765 | 466 | 469 | .421 | 5727 | 5501 | 6025 | 1.967 | 2.793 | 2658 | 2727 | 7,201 |
| 20 | | 1.022 | .176 | 767 | 466 | 469 | .422 | 5606 | 5385 | 5898 | 1.906 | 2.716 | 2479 | 2536 | 6,691 |
| 21 | | 1.298 | .622 | 763 | 458 | 493 | .495 | 6215 | 6022 | 6377 | 2.054 | 2.968 | 3114 | 3204 | 9,655 |
| 22 | | 1.306 | .630 | 759 | 458 | 494 | .494 | 6093 | 5904 | 6245 | 2.021 | 2.866 | 2967 | 3068 | 6,335 |
| 23 | | 1.312 | .636 | 760 | 456 | 493 | .495 | 6093 | 5816 | 6251 | 2.008 | 2.870 | 2943 | 3040 | 6,245 |
| 24 | | 1.297 | .621 | 762 | 458 | 493 | .495 | 5971 | 5786 | 6126 | 1.961 | 2.789 | 2845 | 2930 | 6,094 |
| 25 | | 1.301 | .625 | 762 | 457 | 493 | .495 | 5848 | 5668 | 6001 | 1.897 | 2.710 | 2655 | 2735 | 5,668 |
| 26 | | 1.299 | .623 | 762 | 458 | 494 | .494 | 5727 | 5549 | 5870 | 1.826 | 2.619 | 2418 | 2491 | 5,167 |
| 27 | | 1.313 | .636 | 761 | 457 | 494 | .495 | 5606 | 5438 | 5746 | 1.745 | 2.547 | 2158 | 2227 | 4,571 |
| 28 | | 1.302 | .626 | 769 | 428 | 462 | .551 | 5484 | 5495 | 5813 | 1.801 | 2.584 | 2330 | 2379 | 4,926 |
| 29 | | 1.312 | .636 | 769 | 427 | 462 | .553 | 5240 | 5256 | 5554 | 1.607 | 2.400 | 1804 | 1842 | 3,783 |
| 30 | 35,000 | 1.019 | 0.164 | 479 | 455 | 458 | 0.271 | 6215 | 5781 | 6613 | 2.234 | 3.367 | 2103 | 2187 | 9,119 |
| 31 | | 1.015 | .147 | 478 | 456 | 458 | .271 | 6093 | 5663 | 6483 | 2.192 | 3.253 | 2018 | 2103 | 8,805 |
| 32 | | 1.015 | .147 | 479 | 456 | 458 | .271 | 5971 | 5550 | 6353 | 2.142 | 3.142 | 1959 | 2037 | 8,529 |
| 33 | | 1.017 | .155 | 479 | 456 | 458 | .271 | 5849 | 5438 | 6223 | 2.125 | 3.037 | 1847 | 1921 | 8,025 |
| 34 | | 1.015 | .147 | 479 | 456 | 458 | .271 | 5727 | 5323 | 6094 | 2.062 | 2.959 | 1768 | 1839 | 7,698 |
| 35 | | 1.015 | .147 | 479 | 457 | 459 | .271 | 5606 | 5205 | 5959 | 1.998 | 2.887 | 1656 | 1722 | 7,210 |
| 36 | | 1.017 | .155 | 479 | 459 | 461 | .268 | 5484 | 5081 | 5819 | 1.897 | 2.792 | 1529 | 1590 | 6,644 |
| 37 | | 1.029 | .203 | 479 | 456 | 460 | .272 | 5240 | 4871 | 5565 | 1.700 | 2.609 | 1219 | 1268 | 5,232 |
| 38 | | 1.303 | .627 | 479 | 429 | 463 | .342 | 6215 | 5956 | 6582 | 2.202 | 3.240 | 2241 | 2331 | 7,599 |
| 39 | | 1.308 | .632 | 478 | 428 | 462 | .341 | 6093 | 5846 | 6459 | 2.152 | 3.149 | 2137 | 2227 | 7,236 |
| 40 | | 1.310 | .634 | 478 | 428 | 462 | .341 | 5971 | 5729 | 6329 | 2.102 | 3.039 | 2047 | 2133 | 6,919 |
| 41 | | 1.319 | .642 | 479 | 427 | 462 | .345 | 5849 | 5619 | 6200 | 2.006 | 2.933 | 1961 | 2039 | 6,565 |
| 42 | | 1.303 | .627 | 482 | 428 | 462 | .344 | 5727 | 5495 | 6071 | 1.976 | 2.846 | 1815 | 1875 | 6,115 |
| 43 | | 1.311 | .634 | 479 | 428 | 462 | .344 | 5606 | 5383 | 5942 | 1.912 | 2.762 | 1648 | 1714 | 5,552 |
| 44 | | 1.315 | .638 | 480 | 422 | 456 | .357 | 5484 | 5299 | 5851 | 1.846 | 2.686 | 1578 | 1638 | 5,291 |
| 45 | | 1.322 | .645 | 481 | 420 | 455 | .357 | 5240 | 5075 | 5596 | 1.660 | 2.514 | 1309 | 1355 | 4,355 |
| 46 | | 1.883 | .996 | 477 | 391 | 469 | .483 | 6215 | 6240 | 6538 | 2.110 | 3.115 | 2952 | 3082 | 6,955 |
| 47 | | 1.866 | .988 | 477 | 392 | 469 | .480 | 6093 | 6105 | 6410 | 2.061 | 3.006 | 2783 | 2905 | 6,618 |
| 48 | | 1.864 | .987 | 479 | 392 | 468 | .482 | 5971 | 5982 | 6287 | 2.006 | 2.908 | 2641 | 2747 | 6,259 |
| 49 | | 1.885 | .997 | 477 | 390 | 468 | .484 | 5849 | 5878 | 6159 | 1.952 | 2.827 | 2549 | 2661 | 6,000 |
| 50 | | 1.872 | .991 | 478 | 392 | 469 | .482 | 5727 | 5736 | 6025 | 1.906 | 2.733 | 2349 | 2448 | 5,553 |
| 51 | | 1.889 | .999 | 478 | 391 | 469 | .490 | 5606 | 5628 | 5898 | 1.832 | 2.655 | 2155 | 2246 | 5,049 |
| 52 | | 1.903 | 1.005 | 475 | 389 | 468 | 0.492 | 5484 | 5517 | 5775 | 1.750 | 2.558 | 2004 | 2100 | 4,691 |
| 53 | | 1.903 | 1.005 | 475 | 390 | 469 | .492 | 5240 | 5266 | 5512 | 1.561 | 2.377 | 1503 | 1575 | 3,519 |
| 54 | | 1.874 | .992 | 477 | 520 | 622 | .336 | 6215 | 5410 | 5677 | 1.702 | 2.568 | 1849 | 1930 | 4,377 |
| 55 | 45,000 | 1.014 | 0.141 | 288 | 454 | 456 | 0.160 | 6215 | 5782 | 6631 | 2.370 | 3.559 | 1387 | 1483 | 10,052 |
| 56 | | 1.021 | .173 | 288 | 453 | 456 | .160 | 6093 | 5675 | 6501 | 2.327 | 3.458 | 1332 | 1424 | 9,586 |
| 57 | | 1.017 | .155 | 289 | 454 | 456 | .160 | 5971 | 5555 | 6371 | 2.272 | 3.357 | 1291 | 1376 | 9,291 |
| 58 | | 1.024 | .184 | 288 | 454 | 457 | .160 | 5849 | 5442 | 6235 | 2.197 | 3.247 | 1224 | 1308 | 8,780 |
| 59 | | 1.021 | .174 | 290 | 453 | 456 | .160 | 5727 | 5334 | 6111 | 2.132 | 3.134 | 1146 | 1217 | 8,193 |
| 60 | | 1.024 | .184 | 291 | 454 | 457 | .160 | 5606 | 5216 | 5976 | 2.034 | 3.028 | 1026 | 1086 | 7,286 |
| 61 | | 1.021 | .173 | 289 | 454 | 457 | .161 | 5484 | 5102 | 5846 | 1.949 | 2.930 | 953 | 1016 | 6,836 |
| 62 | | 1.021 | .173 | 288 | 455 | 458 | .159 | 5362 | 4983 | 5705 | 1.867 | 2.852 | 879 | 940 | 6,326 |
| 63 | | 1.359 | .677 | 290 | 416 | 454 | .222 | 6215 | 6041 | 6644 | 2.272 | 3.454 | 1502 | 1595 | 8,067 |
| 64 | | 1.360 | .678 | 289 | 415 | 453 | .222 | 6093 | 5929 | 6526 | 2.206 | 3.340 | 1436 | 1531 | 7,731 |
| 65 | | 1.362 | .680 | 290 | 415 | 453 | .222 | 5971 | 5810 | 6395 | 2.152 | 3.230 | 1389 | 1475 | 7,441 |
| 66 | | 1.362 | .680 | 290 | 415 | 453 | .222 | 5849 | 5692 | 6264 | 2.099 | 3.137 | 1322 | 1404 | 7,082 |
| 67 | | 1.348 | .668 | 290 | 416 | 453 | .220 | 5727 | 5567 | 6134 | 2.033 | 3.020 | 1199 | 1273 | 6,489 |
| 68 | | 1.347 | .667 | 291 | 416 | 453 | .221 | 5606 | 5449 | 6004 | 1.987 | 2.934 | 1127 | 1192 | 6,084 |
| 69 | 55,000 | 1.006 | 0.092 | 168 | 453 | 454 | 0.095 | 6093 | 5675 | 6513 | 2.473 | 3.711 | 873 | 993 | 10,930 |
| 70 | | 1.024 | .184 | 167 | 450 | 453 | .095 | 5971 | 5580 | 6395 | 2.351 | 3.636 | 804 | 920 | 9,945 |
| 71 | | 1.024 | .184 | 168 | 451 | 454 | .095 | 5849 | 5460 | 6253 | 2.291 | 3.513 | 760 | 864 | 9,348 |
| 72 | | 1.552 | .819 | 172 | 400 | 454 | .152 | 6215 | 6160 | 6644 | 2.322 | 3.581 | 1111 | 1233 | 8,805 |
| 73 | | 1.559 | .823 | 170 | 399 | 453 | .151 | 6093 | 6047 | 6526 | 2.291 | 3.470 | 1056 | 1187 | 8,432 |
| 74 | | 1.540 | .811 | 174 | 400 | 453 | .153 | 5971 | 5926 | 6395 | 2.231 | 3.355 | 1027 | 1128 | 8,109 |
| 75 | | 1.561 | .824 | 173 | 399 | 453 | .153 | 5849 | 5805 | 6264 | 2.170 | 3.245 | 945 | 1043 | 7,406 |
| 76 | | 1.541 | .812 | 172 | 400 | 453 | .152 | 5727 | 5677 | 6134 | 2.102 | 3.148 | 916 | 1017 | 7,314 |
| 77 | | 1.555 | .820 | 173 | 399 | 453 | .155 | 5606 | 5564 | 6004 | 1.996 | 3.093 | 866 | 956 | 6,812 |

NACA

DATA FOR YJ71-A-7 TURBOJET ENGINE

area, 3.18 square feet

| $F_J$, lb | Jet thrust Adjusted, $\frac{F_J}{\delta_a}$, lb | Corrected, $\frac{F_J}{\delta_T}$, lb | $W_a$, lb/sec | Air flow Adjusted, $\frac{W_a\sqrt{\theta_a}}{\delta_a}$, lb/sec | Corrected, $\frac{W_a\sqrt{\theta_T}}{\delta_T}$, lb/sec | $W_f$, lb/hr | Fuel flow Adjusted, $\frac{W_f}{\delta_a\sqrt{\theta_a}}$, lb/hr | Corrected, $\frac{W_f}{\delta_T\sqrt{\theta_T}}$, lb/hr | Specific fuel consumption $\frac{W_f}{F_n}$, lb/hr/lb thrust | Adjusted, $\frac{W_f}{F_n\sqrt{\theta_a}}$, lb/hr/lb thrust | Corrected, $\frac{W_f}{F_n\sqrt{\theta_T}}$, lb/hr/lb thrust | $T_6$, °R | Exhaust-gas total temperature Adjusted, $\frac{T_6}{\theta_a}$, °R | Corrected, $\frac{T_6}{\theta_T}$, °R | Run number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6607 | 6627 | 8,193 | 135.5 | 139.3 | 168.9 | 6250 | 6117 | 7,713 | 1.03 | 1.01 | 1.03 | 1453 | 1384 | 1439 | 1 |
| 6399 | 6431 | 7,909 | 133.8 | 138.0 | 166.5 | 5975 | 5849 | 7,329 | 1.05 | 1.02 | 1.04 | 1430 | 1356 | 1408 | 2 |
| 6045 | 6075 | 7,472 | 130.8 | 134.8 | 162.6 | 5585 | 5472 | 6,857 | 1.04 | 1.01 | 1.03 | 1361 | 1293 | 1343 | 3 |
| 5563 | 5596 | 6,881 | 127.0 | 131.1 | 158.0 | 5195 | 5095 | 6,383 | 1.06 | 1.03 | 1.05 | 1346 | 1279 | 1328 | 4 |
| 5185 | 5201 | 6,388 | 123.1 | 126.7 | 152.8 | 4815 | 4708 | 5,886 | 1.06 | 1.04 | 1.06 | 1328 | 1262 | 1308 | 5 |
| 4772 | 4796 | 5,879 | 119.4 | 122.7 | 147.8 | 4340 | 4264 | 5,321 | 1.06 | 1.03 | 1.05 | 1277 | 1221 | 1265 | 6 |
| 4297 | 4323 | 5,281 | 114.4 | 117.8 | 141.3 | 3960 | 3895 | 4,843 | 1.10 | 1.08 | 1.10 | 1248 | 1193 | 1236 | 7 |
| 3503 | 3528 | 4,302 | 104.0 | 107.0 | 128.3 | 3280 | 3232 | 4,008 | 1.16 | 1.13 | 1.15 | 1186 | 1136 | 1175 | 8 |
| 5055 | 5095 | 8,892 | 99.1 | 102.8 | 170.1 | 4770 | 4674 | 8,600 | 1.05 | 1.02 | 1.08 | 1462 | 1382 | 1537 | 9 |
| 4903 | 4932 | 8,605 | 98.8 | 102.3 | 169.2 | 4530 | 4430 | 8,148 | 1.03 | 1.00 | 1.06 | 1416 | 1338 | 1488 | 10 |
| ---- | ---- | ------ | ----- | ----- | ----- | 4220 | ---- | ------ | ---- | ---- | ---- | 1384 | ---- | 1457 | 11 |
| 4476 | 4503 | 7,842 | 96.1 | 99.4 | 164.2 | 4520 | 4424 | 8,117 | 1.15 | 1.11 | 1.17 | 1342 | 1271 | 1410 | 12 |
| 4193 | 4218 | 7,321 | 93.8 | 97.1 | 159.9 | 3715 | 3634 | 6,642 | 1.02 | .99 | 1.05 | 1308 | 1236 | 1372 | 13 |
| 3888 | 3904 | 6,773 | 90.9 | 93.9 | 154.6 | 3445 | 3362 | 6,146 | 1.03 | 1.00 | 1.06 | 1276 | 1206 | 1339 | 14 |
| 3482 | 3573 | 9,530 | 65.7 | 70.3 | 171.1 | 3375 | 3319 | 9,719 | 1.05 | 1.00 | 1.10 | 1481 | 1361 | 1639 | 15 |
| 3446 | 3536 | 9,359 | 65.9 | 70.5 | 170.2 | 3180 | 3131 | 9,085 | 1.03 | .98 | 1.08 | 1429 | 1316 | 1582 | 16 |
| 3267 | 3352 | 8,932 | 65.5 | 70.0 | 170.2 | 3000 | 2954 | 8,629 | 1.00 | .96 | 1.06 | 1385 | 1275 | 1533 | 17 |
| 3220 | 3301 | 8,736 | 65.0 | 69.4 | 167.6 | 2845 | 2798 | 8,120 | .99 | .95 | 1.04 | 1346 | 1239 | 1490 | 18 |
| 3022 | 3101 | 8,187 | 64.0 | 68.3 | 164.7 | 2655 | 2616 | 7,566 | 1.00 | .96 | 1.05 | 1310 | 1209 | 1450 | 19 |
| 2841 | 2906 | 7,668 | 62.5 | 66.6 | 160.4 | 2490 | 2447 | 7,069 | 1.00 | .96 | 1.06 | 1274 | 1176 | 1410 | 20 |
| 4776 | 4915 | 10,206 | 81.9 | 87.0 | 170.7 | 3960 | 3948 | 8,683 | 1.27 | 1.23 | 1.30 | 1463 | 1374 | 1541 | 21 |
| 4637 | 4795 | 9,900 | 81.3 | 86.7 | 169.3 | 3745 | 3752 | 8,196 | 1.26 | 1.22 | 1.29 | 1416 | 1329 | 1488 | 22 |
| 4633 | 4786 | 9,831 | 81.7 | 86.9 | 169.0 | 3735 | 3747 | 8,132 | 1.27 | 1.23 | 1.30 | 1415 | 1334 | 1490 | 23 |
| 4471 | 4605 | 9,577 | 80.3 | 85.3 | 167.7 | 3490 | 3483 | 7,671 | 1.23 | 1.19 | 1.26 | 1375 | 1291 | 1448 | 24 |
| 4264 | 4392 | 9,104 | 79.0 | 83.9 | 164.4 | 3260 | 3257 | 7,142 | 1.23 | 1.19 | 1.26 | 1336 | 1257 | 1407 | 25 |
| 3980 | 4099 | 8,505 | 76.9 | 81.7 | 160.2 | 3025 | 3019 | 6,627 | 1.25 | 1.21 | 1.28 | 1294 | 1215 | 1360 | 26 |
| 3713 | 3832 | 7,864 | 75.0 | 79.8 | 155.0 | 2810 | 2813 | 6,100 | 1.30 | 1.26 | 1.33 | 1258 | 1184 | 1322 | 27 |
| 3899 | 3981 | 8,242 | 79.5 | 81.0 | 158.6 | 2830 | 2896 | 6,342 | 1.21 | 1.22 | 1.29 | 1194 | 1200 | 1342 | 28 |
| 3281 | 3350 | 6,880 | 73.8 | 75.1 | 146.0 | 2300 | 2355 | 5,112 | 1.27 | 1.28 | 1.35 | 1109 | 1117 | 1247 | 29 |
| 2327 | 2420 | 10,090 | 41.9 | 46.9 | 170.8 | 2350 | 2273 | 10,840 | 1.12 | 1.04 | 1.19 | 1542 | 1334 | 1746 | 30 |
| 2216 | 2309 | 9,668 | 41.5 | 46.6 | 170.2 | 2210 | 2140 | 10,257 | 1.09 | 1.02 | 1.16 | 1490 | 1287 | 1687 | 31 |
| 2156 | 2242 | 9,387 | 41.4 | 46.3 | 169.2 | 2090 | 2021 | 9,683 | 1.07 | .99 | 1.13 | 1439 | 1243 | 1629 | 32 |
| 2055 | 2137 | 8,929 | 41.2 | 46.1 | 168.2 | 1970 | 1905 | 9,107 | 1.07 | .99 | 1.13 | 1391 | 1202 | 1575 | 33 |
| 1961 | 2039 | 8,538 | 40.5 | 45.3 | 165.5 | 1840 | 1778 | 8,525 | 1.04 | .97 | 1.11 | 1355 | 1171 | 1534 | 34 |
| 1846 | 1920 | 8,037 | 39.8 | 44.6 | 163.0 | 1735 | 1675 | 8,029 | 1.05 | .97 | 1.11 | 1325 | 1142 | 1497 | 35 |
| 1723 | 1792 | 7,486 | 38.4 | 43.1 | 157.2 | 1574 | 1516 | 7,256 | 1.03 | .95 | 1.09 | 1287 | 1105 | 1449 | 36 |
| 1452 | 1510 | 6,232 | 35.3 | 39.6 | 142.8 | 1277 | 1234 | 5,820 | 1.05 | .97 | 1.11 | 1200 | 1037 | 1354 | 37 |
| 3297 | 3429 | 11,180 | 53.4 | 58.0 | 171.0 | 2845 | 2835 | 10,217 | 1.27 | 1.22 | 1.34 | 1500 | 1378 | 1682 | 38 |
| 3197 | 3331 | 10,825 | 53.2 | 57.8 | 170.1 | 2665 | 2664 | 9,565 | 1.25 | 1.20 | 1.32 | 1455 | 1339 | 1635 | 39 |
| 3113 | 3244 | 10,522 | 53.4 | 57.9 | 170.2 | 2515 | 2514 | 9,011 | 1.23 | 1.18 | 1.30 | 1404 | 1292 | 1578 | 40 |
| 3028 | 3149 | 10,138 | 52.8 | 57.2 | 166.9 | 2330 | 2328 | 8,270 | 1.19 | 1.14 | 1.26 | 1355 | 1250 | 1523 | 41 |
| 2844 | 2938 | 9,581 | 52.1 | 56.0 | 165.5 | 2195 | 2175 | 7,840 | 1.21 | 1.16 | 1.28 | 1315 | 1211 | 1478 | 42 |
| 2674 | 2781 | 9,009 | 51.3 | 55.6 | 163.2 | 2055 | 2051 | 7,338 | 1.25 | 1.20 | 1.32 | 1276 | 1175 | 1434 | 43 |
| 2587 | 2685 | 8,674 | 50.5 | 54.2 | 158.7 | 1925 | 1931 | 6,887 | 1.22 | 1.18 | 1.30 | 1225 | 1144 | 1394 | 44 |
| 2262 | 2341 | 7,526 | 47.3 | 50.6 | 147.5 | 1575 | 1579 | 5,596 | 1.20 | 1.16 | 1.28 | 1144 | 1073 | 1305 | 45 |
| 5255 | 5486 | 12,381 | 76.8 | 79.8 | 171.9 | 3780 | 3962 | 9,370 | 1.28 | 1.28 | 1.35 | 1461 | 1473 | 1617 | 46 |
| 5042 | 5264 | 11,990 | 75.8 | 79.0 | 171.3 | 3525 | 3687 | 8,818 | 1.27 | 1.27 | 1.33 | 1410 | 1417 | 1561 | 47 |
| 4895 | 5091 | 11,601 | 75.7 | 78.6 | 170.4 | 3320 | 3460 | 8,286 | 1.26 | 1.26 | 1.32 | 1361 | 1368 | 1509 | 48 |
| 4812 | 5024 | 11,327 | 75.4 | 78.4 | 168.6 | 3120 | 3274 | 7,733 | 1.22 | 1.23 | 1.29 | 1323 | 1336 | 1467 | 49 |
| 4558 | 4749 | 10,775 | 73.9 | 76.8 | 166.0 | 2920 | 3049 | 7,262 | 1.24 | 1.24 | 1.31 | 1282 | 1288 | 1419 | 50 |
| 4344 | 4526 | 10,178 | 72.7 | 75.5 | 162.0 | 2710 | 2835 | 6,680 | 1.26 | 1.26 | 1.32 | 1245 | 1255 | 1378 | 51 |
| 4133 | 4331 | 9,675 | 70.5 | 73.4 | 156.7 | 2500 | 2617 | 6,164 | 1.25 | 1.25 | 1.31 | 1197 | 1213 | 1327 | 52 |
| 3470 | 3637 | 8,123 | 65.0 | 67.8 | 144.7 | 2010 | 2117 | 4,951 | 1.34 | 1.34 | 1.41 | 1115 | 1126 | 1234 | 53 |
| 3862 | 4032 | 9,141 | 58.4 | 70.1 | 151.5 | 2945 | 2677 | 6,367 | 1.59 | 1.39 | 1.45 | 1597 | 1210 | 1333 | 54 |
| 1503 | 1607 | 10,892 | 25.3 | 29.0 | 171.7 | 1582 | 1574 | 12,233 | 1.14 | 1.06 | 1.22 | 1623 | 1405 | 1847 | 55 |
| 1474 | 1576 | 10,608 | 25.3 | 29.1 | 170.7 | 1502 | 1496 | 11,537 | 1.13 | 1.05 | 1.20 | 1577 | 1368 | 1795 | 56 |
| 1417 | 1511 | 10,198 | 25.1 | 28.8 | 169.5 | 1404 | 1392 | 10,781 | 1.09 | 1.01 | 1.16 | 1531 | 1325 | 1742 | 57 |
| 1373 | 1468 | 9,849 | 25.0 | 28.0 | 168.0 | 1316 | 1308 | 10,064 | 1.07 | 1.00 | 1.15 | 1484 | 1285 | 1686 | 58 |
| 1284 | 1364 | 9,179 | 24.5 | 28.0 | 164.3 | 1225 | 1212 | 9,344 | 1.07 | 1.00 | 1.14 | 1429 | 1240 | 1626 | 59 |
| 1169 | 1237 | 8,301 | 24.0 | 27.2 | 159.7 | 1134 | 1116 | 8,585 | 1.10 | 1.03 | 1.18 | 1384 | 1198 | 1572 | 60 |
| 1081 | 1152 | 7,754 | 22.8 | 26.1 | 153.4 | 1028 | 1019 | 7,862 | 1.08 | 1.00 | 1.15 | 1339 | 1159 | 1521 | 61 |
| 1002 | 1071 | 7,211 | 21.9 | 25.2 | 148.0 | 941 | 935 | 7,204 | 1.07 | 1.00 | 1.14 | 1306 | 1128 | 1478 | 62 |
| 2221 | 2359 | 11,929 | 39.1 | 37.3 | 171.5 | 1960 | 2023 | 11,252 | 1.30 | 1.27 | 1.39 | 1568 | 1481 | 1792 | 63 |
| 2147 | 2289 | 11,559 | 33.8 | 37.0 | 169.9 | 1830 | 1899 | 10,553 | 1.27 | 1.24 | 1.36 | 1513 | 1433 | 1735 | 64 |
| 2103 | 2233 | 11,266 | 33.8 | 36.9 | 169.4 | 1725 | 1783 | 9,694 | 1.24 | 1.21 | 1.33 | 1463 | 1385 | 1678 | 65 |
| 2030 | 2156 | 10,875 | 33.5 | 36.6 | 167.9 | 1630 | 1684 | 9,353 | 1.23 | 1.20 | 1.32 | 1421 | 1346 | 1630 | 66 |
| 1879 | 1995 | 10,169 | 32.8 | 35.8 | 165.7 | 1510 | 1559 | 8,751 | 1.26 | 1.22 | 1.35 | 1368 | 1292 | 1569 | 67 |
| 1792 | 1896 | 9,673 | 32.1 | 34.9 | 161.8 | 1378 | 1417 | 7,967 | 1.22 | 1.19 | 1.31 | 1329 | 1256 | 1524 | 68 |
| 918 | 1044 | 11,493 | 14.9 | 18.2 | 174.4 | 1018 | 1078 | 13,622 | 1.17 | 1.09 | 1.25 | 1685 | 1462 | 1926 | 69 |
| 890 | 1018 | 11,009 | 14.4 | 17.7 | 166.9 | 941 | 1006 | 12,469 | 1.17 | 1.09 | 1.25 | 1647 | 1438 | 1889 | 70 |
| 845 | 961 | 10,394 | 14.3 | 17.4 | 164.7 | 879 | 933 | 11,562 | 1.16 | 1.08 | 1.24 | 1595 | 1390 | 1823 | 71 |
| 1684 | 1869 | 13,346 | 23.0 | 25.7 | 170.4 | 1433 | 1576 | 12,141 | 1.29 | 1.28 | 1.38 | 1626 | 1598 | 1859 | 72 |
| 1624 | 1825 | 12,968 | 22.7 | 25.7 | 169.1 | 1354 | 1511 | 11,578 | 1.28 | 1.27 | 1.37 | 1572 | 1548 | 1803 | 73 |
| 1597 | 1754 | 12,610 | 23.1 | 25.5 | 170.1 | 1281 | 1394 | 10,833 | 1.25 | 1.24 | 1.34 | 1520 | 1493 | 1743 | 74 |
| 1518 | 1676 | 11,897 | 22.9 | 25.4 | 167.4 | 1205 | 1320 | 10,118 | 1.25 | 1.24 | 1.34 | 1470 | 1448 | 1686 | 75 |
| 1461 | 1622 | 11,666 | 22.0 | 24.7 | 164.5 | 1104 | 1214 | 9,438 | 1.20 | 1.19 | 1.29 | 1426 | 1401 | 1636 | 76 |
| 1408 | 1554 | 11,075 | 21.7 | 24.2 | 159.5 | 1022 | 1119 | 8,613 | 1.18 | 1.17 | 1.26 | 1404 | 1380 | 1607 | 77 |

NACA

TABLE I. – Concluded.  PERFORMANCE

(e) Exhaust-nozzle

| Run number | Altitude, H, ft | Ram pressure ratio, $\frac{P_1}{P_0}$ | Flight Mach number, $M_0$ | Tunnel static pressure, $P_0$, lb/sq ft abs | Equivalent ambient air temperature, $t_0$, °R | Engine-inlet indicated temperature, $T_1$, °R | Reynolds number index, $\frac{\delta_T}{\phi_T\sqrt{\theta_T}}$ | Engine speed N, rpm | Engine speed Adjusted $\frac{N}{\sqrt{\theta_a}}$, rpm | Engine speed Corrected $\frac{N}{\sqrt{\theta_T}}$, rpm | Engine total-pressure ratio $\frac{P_4}{P_1}$ | Engine total-temperature ratio $\frac{T_6}{T_1}$ | Net thrust $F_n$, lb | Net thrust Adjusted $\frac{F_n}{\delta_a}$, lb | Net thrust Corrected $\frac{F_n}{\delta_T}$, lb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,000 | 1.015 | 0.147 | 1680 | 520 | 522 | 0.801 | 6215 | 6082 | 6197 | 1.759 | 2.582 | 4343 | 4382 | 5390 |
| 2 | | 1.017 | .155 | 1685 | 524 | 527 | .789 | 6093 | 5940 | 6047 | 1.714 | 2.480 | 4046 | 4070 | 4997 |
| 3 | | 1.016 | .152 | 1690 | 525 | 527 | .790 | 5971 | 5816 | 5926 | 1.665 | 2.429 | 3752 | 3763 | 4622 |
| 4 | | 1.016 | .152 | 1690 | 526 | 528 | .789 | 5849 | 5691 | 5799 | 1.610 | 2.379 | 3486 | 3496 | 4295 |
| 5 | | 1.018 | .160 | 1687 | 524 | 527 | .790 | 5727 | 5583 | 5683 | 1.553 | 2.321 | 3119 | 3135 | 3843 |
| 6 | | 1.018 | .160 | 1686 | 524 | 527 | .790 | 5727 | 5583 | 5683 | 1.538 | 2.313 | 3067 | 3082 | 3779 |
| 7 | | 1.024 | .184 | 1686 | 519 | 523 | .818 | 5606 | 5491 | 5585 | 1.488 | 2.254 | 2656 | 2669 | 3254 |
| 8 | | 1.019 | .164 | 1690 | 520 | 523 | .816 | 5484 | 5367 | 5463 | 1.426 | 2.197 | 2478 | 2485 | 3045 |
| 9 | | 1.026 | .192 | 1690 | 519 | 523 | .821 | 5240 | 5133 | 5220 | 1.308 | 2.078 | 1845 | 1851 | 2251 |
| 10 | 15,000 | 1.023 | 0.180 | 1190 | 493 | 496 | 0.604 | 6215 | 6036 | 6358 | 1.833 | 2.760 | ---- | ---- | ---- |
| 11 | | 1.024 | .184 | 1188 | 485 | 488 | .618 | 6093 | 5966 | 6288 | 1.803 | 2.695 | ---- | ---- | ---- |
| 12 | | 1.022 | .176 | 1186 | 485 | 488 | .617 | 5971 | 5847 | 6162 | 1.762 | 2.611 | 3046 | 3064 | 5318 |
| 13 | | 1.024 | .184 | 1185 | 490 | 493 | .608 | 5971 | 5817 | 6126 | 1.745 | 2.588 | 2993 | 3014 | 5220 |
| 14 | | 1.023 | .180 | 1188 | 492 | 495 | .603 | 5848 | 5686 | 5989 | 1.702 | 2.521 | 2810 | 2821 | 4895 |
| 15 | | 1.022 | .176 | 1189 | 486 | 489 | .612 | 5727 | 5602 | 5899 | 1.669 | 2.483 | 2673 | 2681 | 4656 |
| 16 | | 1.024 | .184 | 1186 | 485 | 488 | .611 | 5606 | 5489 | 5785 | 1.611 | 2.400 | 2387 | 2401 | 4158 |
| 17 | 25,000 | 1.018 | 0.160 | 768 | 455 | 457 | 0.437 | 6215 | 6042 | 6625 | 1.917 | 3.004 | 2378 | 2430 | 6435 |
| 18 | | 1.021 | .173 | 766 | 457 | 460 | .431 | 6093 | 5910 | 6471 | 1.862 | 2.863 | 2231 | 2287 | 6037 |
| 19 | | 1.021 | .173 | 767 | 456 | 459 | .432 | 5971 | 5798 | 6347 | 1.833 | 2.786 | 2146 | 2195 | 5798 |
| 20 | | 1.023 | .180 | 767 | 456 | 459 | .436 | 5727 | 5561 | 6088 | 1.740 | 2.617 | 1916 | 1960 | 5166 |
| 21 | | 1.259 | .584 | 765 | 444 | 474 | .510 | 6215 | 6116 | 6501 | 1.844 | 2.863 | 2312 | 2372 | 5079 |
| 22 | | 1.261 | .586 | 767 | 444 | 474 | .512 | 6093 | 5996 | 6373 | 1.810 | 2.753 | 2196 | 2247 | 4805 |
| 23 | | 1.264 | .589 | 765 | 441 | 472 | .514 | 5971 | 5896 | 6264 | 1.766 | 2.667 | 2035 | 2088 | 4453 |
| 24 | | 1.267 | .592 | 764 | 441 | 472 | .515 | 5849 | 5776 | 6136 | 1.717 | 2.593 | 1932 | 1984 | 4223 |
| 25 | | 1.264 | .589 | 766 | 442 | 473 | .514 | 5727 | 5649 | 5996 | 1.675 | 2.510 | 1718 | 1761 | 3756 |
| 26 | | 1.264 | .589 | 764 | 441 | 472 | .513 | 5606 | 5536 | 5881 | 1.622 | 2.445 | 1557 | 1599 | 3410 |
| 27 | | 1.313 | .636 | 769 | 426 | 460 | .557 | 5484 | 5506 | 5824 | 1.573 | 2.391 | 1523 | 1555 | 3191 |
| 28 | | 1.306 | .630 | 769 | 427 | 461 | .554 | 5240 | 5256 | 5560 | 1.435 | 2.223 | 1032 | 1054 | 2175 |
| 29 | 35,000 | 1.017 | 0.155 | 481 | 457 | 459 | 0.271 | 6215 | 5772 | 6607 | 1.959 | 3.094 | 1601 | 1657 | 6928 |
| 30 | | 1.017 | .155 | 477 | 457 | 459 | .269 | 6093 | 5659 | 6477 | 1.940 | 3.002 | 1492 | 1558 | 6510 |
| 31 | | 1.019 | .164 | 479 | 456 | 459 | .270 | 5971 | 5547 | 6347 | 1.885 | 2.889 | 1432 | 1489 | 6209 |
| 32 | | 1.015 | .147 | 477 | 457 | 459 | .269 | 5849 | 5431 | 6217 | 1.860 | 2.806 | 1357 | 1417 | 5933 |
| 33 | | 1.010 | .118 | 479 | 458 | 459 | .269 | 5727 | 5314 | 6088 | 1.812 | 2.717 | 1319 | 1372 | 5767 |
| 34 | | 1.017 | .155 | 477 | 456 | 458 | .270 | 5606 | 5212 | 5965 | 1.748 | 2.644 | 1158 | 1209 | 5052 |
| 35 | | 1.023 | .180 | 479 | 456 | 459 | .270 | 5484 | 5097 | 5829 | 1.659 | 2.553 | 1061 | 1103 | 4581 |
| 36 | | 1.029 | .203 | 477 | 456 | 460 | .270 | 5240 | 4871 | 5565 | 1.519 | 2.409 | 829 | 865 | 3573 |
| 37 | | 1.307 | .631 | 479 | 425 | 459 | .340 | 6215 | 5984 | 6607 | 1.933 | 3.020 | 1649 | 1715 | 5574 |
| 38 | | 1.307 | .631 | 479 | 425 | 459 | .340 | 6093 | 5867 | 6477 | 1.883 | 2.915 | 1551 | 1613 | 5242 |
| 39 | | 1.306 | .630 | 477 | 425 | 459 | .339 | 5971 | 5749 | 6347 | 1.849 | 2.813 | 1439 | 1502 | 4887 |
| 40 | | 1.306 | .630 | 477 | 425 | 459 | .339 | 5849 | 5632 | 6217 | 1.796 | 2.728 | 1382 | 1443 | 4693 |
| 41 | | 1.307 | .631 | 479 | 425 | 459 | .340 | 5727 | 5515 | 6088 | 1.756 | 2.636 | 1229 | 1278 | 4154 |
| 42 | | 1.324 | .647 | 479 | 425 | 461 | .345 | 5606 | 5398 | 5948 | 1.667 | 2.544 | 1139 | 1185 | 3802 |
| 43 | | 1.323 | .645 | 477 | 421 | 456 | .357 | 5484 | 5305 | 5851 | 1.624 | 2.478 | 1021 | 1066 | 3423 |
| 44 | | 1.328 | .650 | 479 | 421 | 457 | .361 | 5362 | 5187 | 5716 | 1.536 | 2.381 | 895 | 931 | 2978 |
| 45 | | 1.881 | .995 | 477 | 395 | 473 | .478 | 6215 | 6207 | 6507 | 1.858 | 2.873 | 2314 | 2416 | 5459 |
| 46 | | 1.881 | .995 | 478 | 395 | 473 | .479 | 6093 | 6085 | 6379 | 1.820 | 2.778 | 2158 | 2249 | 5080 |
| 47 | | 1.873 | .992 | 479 | 394 | 472 | .478 | 5971 | 5969 | 6264 | 1.776 | 2.689 | 2043 | 2125 | 4819 |
| 48 | | 1.893 | 1.000 | 477 | 392 | 471 | .483 | 5849 | 5861 | 6141 | 1.742 | 2.603 | 1958 | 2044 | 4588 |
| 49 | | 1.871 | .991 | 479 | 391 | 468 | .482 | 5727 | 5750 | 6031 | 1.684 | 2.534 | 1759 | 1829 | 4155 |
| 50 | | 1.881 | .995 | 479 | 390 | 467 | .490 | 5606 | 5634 | 5909 | 1.633 | 2.467 | 1631 | 1696 | 3831 |
| 51 | | 1.918 | 1.012 | 475 | 388 | 468 | .495 | 5484 | 5522 | 5775 | 1.562 | 2.400 | 1449 | 1519 | 3366 |
| 52 | | 1.872 | .991 | 478 | 391 | 468 | .479 | 5240 | 5261 | 5518 | 1.385 | 2.233 | 955 | 995 | 2258 |
| 53 | | 1.893 | 1.000 | 477 | 517 | 621 | .341 | 6215 | 5426 | 5682 | 1.505 | 2.386 | 1300 | 1357 | 3046 |
| 54 | | 1.893 | 1.000 | 477 | 524 | 629 | .335 | 6093 | 5283 | 5535 | 1.396 | 2.264 | 1018 | 1063 | 2385 |
| 55 | | 1.906 | 1.006 | 477 | 517 | 622 | .341 | 5971 | 5213 | 5455 | 1.331 | 2.201 | 891 | 930 | 2074 |
| 56 | | 1.891 | 1.000 | 479 | 517 | 620 | .342 | 5849 | 5106 | 5351 | 1.257 | 2.110 | 607 | 631 | 1418 |
| 57 | | 1.918 | 1.012 | 477 | 521 | 628 | .340 | 5727 | 4980 | 5206 | 1.156 | 1.997 | 362 | 378 | 837 |
| 58 | | 1.900 | 1.004 | 478 | 526 | 632 | .335 | 5606 | 4851 | 5080 | 1.067 | 1.910 | 119 | 124 | 277 |
| 59 | 45,000 | 1.017 | 0.155 | 289 | 455 | 457 | 0.160 | 6215 | 5776 | 6625 | 2.037 | 3.230 | 1009 | 1076 | 7262 |
| 60 | | 1.021 | .173 | 289 | 454 | 457 | .161 | 6093 | 5669 | 6495 | 1.990 | 3.138 | 973 | 1037 | 6979 |
| 61 | | 1.021 | .173 | 289 | 455 | 458 | .160 | 5971 | 5549 | 6353 | 1.942 | 3.028 | 914 | 974 | 6556 |
| 62 | | 1.017 | .155 | 289 | 456 | 458 | .159 | 5849 | 5430 | 6223 | 1.901 | 2.945 | 888 | 947 | 6391 |
| 63 | | 1.024 | .184 | 288 | --- | --- | ----- | 5849 | ---- | ---- | 1.895 | ----- | ---- | ---- | ---- |
| 64 | | 1.021 | .173 | 288 | 456 | 459 | .160 | 5727 | 5316 | 6088 | 1.837 | 2.841 | 795 | 850 | 5722 |
| 65 | | 1.021 | .173 | 291 | 455 | 458 | .168 | 5606 | 5210 | 5965 | 1.771 | 2.766 | 740 | 783 | 5273 |
| 66 | | 1.045 | .252 | 288 | 454 | 460 | .170 | 5484 | 5102 | 5824 | 1.661 | 2.678 | 668 | 714 | 4696 |
| 67 | | 1.351 | .670 | 291 | 415 | 452 | .222 | 6215 | 6048 | 6662 | 1.992 | 3.212 | 1143 | 1209 | 6154 |
| 68 | | 1.359 | .677 | 290 | 414 | 452 | .222 | 6093 | 5936 | 6532 | 1.949 | 3.104 | 1093 | 1161 | 5871 |
| 69 | | 1.354 | .673 | 291 | 414 | 452 | .222 | 5971 | 5818 | 6401 | 1.891 | 2.993 | 1033 | 1093 | 5548 |
| 70 | | 1.357 | .675 | 291 | 414 | 452 | .222 | 5849 | 5699 | 6270 | 1.843 | 2.894 | 966 | 1022 | 5175 |
| 71 | | 1.352 | .671 | 293 | 415 | 452 | .223 | 5727 | 5573 | 6139 | 1.795 | 2.805 | 905 | 951 | 4835 |
| 72 | | 1.345 | .665 | 296 | 415 | 452 | .224 | 5606 | 5455 | 6010 | 1.706 | 2.706 | 822 | 856 | 4371 |
| 73 | 55,000 | 1.012 | 0.130 | 170 | 453 | 455 | 0.095 | 6215 | 5789 | 6638 | 2.145 | 3.451 | 619 | 696 | 7614 |
| 74 | | 1.012 | .130 | 173 | 453 | 455 | .095 | 6093 | 5675 | 6507 | 2.086 | 3.365 | 664 | 733 | 8028 |
| 75 | | 1.556 | .821 | 171 | 398 | 452 | .152 | 6215 | 6176 | 6662 | 2.034 | 3.347 | 882 | 985 | 7016 |
| 76 | | 1.547 | .815 | 172 | 400 | 453 | .152 | 6093 | 6039 | 6526 | 1.985 | 3.221 | 838 | 930 | 6666 |
| 77 | | 1.549 | .816 | 175 | 401 | 454 | .154 | 5971 | 5911 | 6383 | 1.926 | 3.104 | 800 | 873 | 6246 |
| 78 | | 1.555 | .820 | 173 | 398 | 452 | .153 | 5849 | 5812 | 6270 | 1.914 | 3.000 | 711 | 785 | 5593 |
| 79 | | 1.546 | .815 | 174 | 399 | 452 | .153 | 5727 | 5684 | 6139 | 1.833 | 2.905 | 668 | 733 | 5254 |
| 80 | | 1.560 | .823 | 175 | 399 | 453 | .156 | 5606 | 5564 | 6004 | 1.777 | 2.806 | 633 | 691 | 4906 |
| 81 | | 1.559 | .823 | 170 | 398 | 452 | .152 | 5484 | 5449 | 5879 | 1.679 | 2.748 | 559 | 628 | 4464 |

NACA

DATA FOR YJ71-A-7 TURBOJET ENGINE

area, 4.13 square feet

| $F_j$, lb | Jet thrust Adjusted, $\frac{F_j}{\delta_a}$, lb | Jet thrust Corrected, $\frac{F_j}{\delta_T}$, lb | $W_a$, lb/sec | Air flow Adjusted, $\frac{W_a\sqrt{\theta_a}}{\delta_a}$, lb/sec | Air flow Corrected, $\frac{W_a\sqrt{\theta_T}}{\delta_T}$, lb/sec | $W_f$, lb/hr | Fuel flow Adjusted, $\frac{W_f}{\delta_a\sqrt{\theta_a}}$, lb/hr | Fuel flow Corrected, $\frac{W_f}{\delta_T\sqrt{\theta_T}}$, lb/hr | Specific fuel consumption $\frac{W_f}{F_n}$, lb/hr lb thrust | Specific fuel consumption Adjusted, $\frac{W_f}{F_n\sqrt{\theta_a}}$, lb/hr lb thrust | Specific fuel consumption Corrected, $\frac{W_f}{F_n\sqrt{\theta_T}}$, lb/hr lb thrust | $T_6$, °R | Exhaust-gas total temp. Adjusted, $\frac{T_6}{\theta_a}$, °R | Exhaust-gas total temp. Corrected, $\frac{T_6}{\theta_T}$, °R | Run number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5034 | 5079 | 6,247 | 135.8 | 140.0 | 169.0 | 5570 | 5500 | 6,893 | 1.28 | 1.26 | 1.28 | 1348 | 1291 | 1340 | 1 |
| 4769 | 4798 | 5,890 | 133.9 | 138.2 | 166.6 | 5235 | 5134 | 6,416 | 1.29 | 1.26 | 1.28 | 1307 | 1242 | 1287 | 2 |
| 4446 | 4459 | 5,477 | 131.0 | 134.9 | 162.6 | 4850 | 4738 | 5,930 | 1.29 | 1.26 | 1.28 | 1280 | 1214 | 1261 | 3 |
| 4161 | 4173 | 5,126 | 127.4 | 131.3 | 158.2 | 4480 | 4372 | 5,473 | 1.28 | 1.25 | 1.27 | 1256 | 1189 | 1235 | 4 |
| 3805 | 3824 | 4,688 | 123.1 | 126.9 | 152.8 | 4130 | 4046 | 5,050 | 1.32 | 1.29 | 1.31 | 1223 | 1162 | 1205 | 5 |
| 3750 | 3769 | 4,620 | 122.7 | 126.5 | 152.2 | 4115 | 4032 | 5,031 | 1.34 | 1.31 | 1.33 | 1219 | 1159 | 1201 | 6 |
| 3424 | 3441 | 4,194 | 120.0 | 123.1 | 147.6 | 3795 | 3736 | 4,632 | 1.43 | 1.40 | 1.42 | 1179 | 1131 | 1170 | 7 |
| 3134 | 3143 | 3,852 | 114.9 | 117.8 | 141.8 | 3510 | 3445 | 4,298 | 1.42 | 1.39 | 1.41 | 1149 | 1100 | 1140 | 8 |
| 2546 | 2554 | 3,106 | 104.9 | 107.4 | 128.5 | 2820 | 2770 | 3,427 | 1.53 | 1.50 | 1.52 | 1087 | 1043 | 1079 | 9 |
| ---- | ---- | ------ | 100.2 | 103.5 | 170.3 | 4275 | 4164 | 7,605 | ---- | ---- | ---- | 1369 | 1291 | 1433 | 10 |
| ---- | ---- | ------ | 100.5 | 103.0 | 169.5 | 4030 | 3962 | 7,237 | ---- | ---- | ---- | 1315 | 1261 | 1400 | 11 |
| 3631 | 3653 | 6,340 | 99.1 | 101.7 | 167.7 | 3785 | 3728 | 6,820 | 1.24 | 1.22 | 1.28 | 1274 | 1222 | 1357 | 12 |
| 3605 | 3630 | 6,287 | 98.4 | 101.6 | 167.3 | 3735 | 3664 | 6,683 | 1.25 | 1.22 | 1.28 | 1276 | 1211 | 1344 | 13 |
| 3400 | 3414 | 5,923 | 96.8 | 100.0 | 164.7 | 3525 | 3441 | 6,289 | 1.25 | 1.22 | 1.28 | 1248 | 1179 | 1309 | 14 |
| 3238 | 3248 | 5,641 | 95.6 | 98.0 | 161.6 | 3330 | 3267 | 5,975 | 1.25 | 1.22 | 1.28 | 1214 | 1162 | 1288 | 15 |
| 2962 | 2980 | 5,160 | 93.0 | 95.5 | 157.1 | 3055 | 3009 | 5,493 | 1.28 | 1.25 | 1.32 | 1171 | 1123 | 1247 | 16 |
| 2727 | 2787 | 7,379 | 67.2 | 70.7 | 170.7 | 3080 | 3060 | 8,884 | 1.29 | 1.26 | 1.38 | 1373 | 1298 | 1560 | 17 |
| 2607 | 2672 | 7,055 | 66.7 | 70.5 | 169.9 | 2855 | 2838 | 8,205 | 1.28 | 1.24 | 1.36 | 1317 | 1239 | 1486 | 18 |
| 2521 | 2579 | 6,812 | 66.5 | 70.1 | 169.0 | 2700 | 2682 | 7,755 | 1.26 | 1.22 | 1.34 | 1279 | 1206 | 1445 | 19 |
| 2299 | 2352 | 6,198 | 66.2 | 68.7 | 165.3 | 2360 | 2345 | 6,764 | 1.23 | 1.20 | 1.31 | 1201 | 1133 | 1357 | 20 |
| 3829 | 3929 | 8,412 | 81.0 | 84.4 | 170.0 | 3580 | 3615 | 8,228 | 1.55 | 1.52 | 1.62 | 1357 | 1314 | 1485 | 21 |
| 3717 | 3802 | 8,133 | 80.9 | 84.0 | 169.1 | 3360 | 3383 | 7,691 | 1.53 | 1.51 | 1.60 | 1305 | 1264 | 1428 | 22 |
| 3555 | 3647 | 7,778 | 80.7 | 83.9 | 168.4 | 3150 | 3192 | 7,229 | 1.55 | 1.53 | 1.62 | 1259 | 1228 | 1385 | 23 |
| 3448 | 3541 | 7,537 | 80.1 | 83.3 | 167.0 | 2965 | 3007 | 6,798 | 1.53 | 1.52 | 1.61 | 1224 | 1194 | 1346 | 24 |
| 3204 | 3284 | 7,004 | 78.8 | 81.9 | 164.5 | 2790 | 2821 | 6,385 | 1.62 | 1.60 | 1.70 | 1187 | 1155 | 1301 | 25 |
| 3014 | 3095 | 6,601 | 77.3 | 80.4 | 161.5 | 2595 | 2632 | 5,961 | 1.67 | 1.65 | 1.75 | 1154 | 1125 | 1269 | 26 |
| 3136 | 3202 | 6,570 | 80.6 | 81.9 | 158.9 | 2480 | 2542 | 5,518 | 1.63 | 1.63 | 1.73 | 1100 | 1110 | 1241 | 27 |
| 2505 | 2558 | 5,281 | 74.3 | 75.6 | 147.6 | 2010 | 2058 | 4,496 | 1.95 | 1.95 | 2.07 | 1025 | 1032 | 1154 | 28 |
| 1812 | 1875 | 7,841 | 41.8 | 46.6 | 170.1 | 2055 | 1975 | 9,450 | 1.28 | 1.19 | 1.36 | 1420 | 1225 | 1605 | 29 |
| 1702 | 1777 | 7,426 | 41.5 | 46.7 | 170.5 | 1935 | 1876 | 8,975 | 1.30 | 1.20 | 1.38 | 1378 | 1189 | 1557 | 30 |
| 1654 | 1720 | 7,172 | 41.5 | 46.4 | 169.1 | 1805 | 1744 | 8,321 | 1.26 | 1.17 | 1.34 | 1326 | 1144 | 1498 | 31 |
| 1553 | 1621 | 6,790 | 41.0 | 46.0 | 168.4 | 1700 | 1647 | 7,900 | 1.25 | 1.16 | 1.33 | 1288 | 1110 | 1455 | 32 |
| 1475 | 1534 | 6,448 | 40.4 | 45.3 | 166.0 | 1590 | 1534 | 7,389 | 1.20 | 1.12 | 1.28 | 1247 | 1073 | 1409 | 33 |
| 1357 | 1417 | 5,921 | 39.5 | 44.4 | 161.9 | 1475 | 1431 | 6,846 | 1.27 | 1.18 | 1.36 | 1211 | 1047 | 1371 | 34 |
| 1288 | 1340 | 5,562 | 38.6 | 43.2 | 156.9 | 1344 | 1299 | 6,170 | 1.27 | 1.18 | 1.35 | 1172 | 1013 | 1324 | 35 |
| 1064 | 1111 | 4,586 | 35.6 | 40.0 | 144.5 | 1103 | 1070 | 5,047 | 1.33 | 1.24 | 1.41 | 1108 | 957 | 1250 | 36 |
| 2709 | 2817 | 9,156 | 53.5 | 57.9 | 170.2 | 2520 | 2524 | 9,055 | 1.53 | 1.47 | 1.62 | 1386 | 1285 | 1566 | 37 |
| 2608 | 2712 | 8,815 | 53.3 | 57.7 | 169.6 | 2360 | 2363 | 8,480 | 1.52 | 1.47 | 1.62 | 1338 | 1240 | 1512 | 38 |
| 2487 | 2596 | 8,446 | 53.0 | 57.5 | 169.3 | 2220 | 2232 | 8,015 | 1.54 | 1.49 | 1.64 | 1291 | 1197 | 1459 | 39 |
| 2425 | 2532 | 8,235 | 52.7 | 57.2 | 168.5 | 2070 | 2081 | 7,471 | 1.50 | 1.44 | 1.59 | 1252 | 1161 | 1415 | 40 |
| 2264 | 2355 | 7,652 | 52.2 | 56.5 | 166.1 | 1950 | 1953 | 7,007 | 1.59 | 1.53 | 1.69 | 1210 | 1122 | 1367 | 41 |
| 2187 | 2274 | 7,300 | 51.6 | 55.8 | 162.3 | 1800 | 1802 | 6,376 | 1.58 | 1.52 | 1.68 | 1173 | 1087 | 1321 | 42 |
| 2044 | 2134 | 6,854 | 50.7 | 54.7 | 159.4 | 1755 | 1773 | 6,280 | 1.72 | 1.66 | 1.83 | 1130 | 1058 | 1286 | 43 |
| 1892 | 1968 | 6,295 | 49.1 | 52.8 | 153.2 | 1505 | 1514 | 5,337 | 1.68 | 1.63 | 1.79 | 1088 | 1018 | 1236 | 44 |
| 4611 | 4814 | 10,877 | 76.2 | 79.6 | 171.6 | 3365 | 3509 | 8,311 | 1.45 | 1.45 | 1.52 | 1359 | 1356 | 1489 | 45 |
| 4450 | 4637 | 10,475 | 76.1 | 79.3 | 170.9 | 3170 | 3299 | 7,813 | 1.47 | 1.47 | 1.54 | 1314 | 1311 | 1440 | 46 |
| 4309 | 4481 | 10,165 | 75.6 | 78.6 | 170.0 | 2965 | 3084 | 7,336 | 1.45 | 1.45 | 1.52 | 1269 | 1269 | 1396 | 47 |
| 4243 | 4430 | 9,941 | 75.7 | 78.9 | 169.0 | 2810 | 2940 | 6,914 | 1.43 | 1.44 | 1.51 | 1226 | 1232 | 1352 | 48 |
| 3968 | 4127 | 9,372 | 74.0 | 76.7 | 166.0 | 2600 | 2714 | 6,467 | 1.48 | 1.48 | 1.56 | 1186 | 1195 | 1315 | 49 |
| 3826 | 3979 | 8,987 | 73.3 | 75.8 | 163.3 | 2435 | 2545 | 6,028 | 1.49 | 1.50 | 1.57 | 1152 | 1164 | 1280 | 50 |
| 3620 | 3794 | 8,409 | 71.5 | 74.4 | 157.8 | 2230 | 2354 | 5,454 | 1.54 | 1.55 | 1.62 | 1123 | 1140 | 1245 | 51 |
| 2889 | 3010 | 6,830 | 64.8 | 67.2 | 145.4 | 1745 | 1826 | 4,343 | 1.83 | 1.83 | 1.92 | 1045 | 1053 | 1159 | 52 |
| 3357 | 3505 | 7,865 | 59.3 | 70.9 | 152.1 | 2610 | 2379 | 5,590 | 2.01 | 1.75 | 1.84 | 1482 | 1129 | 1239 | 53 |
| 2981 | 3112 | 6,984 | 56.3 | 67.8 | 145.2 | 2260 | 2046 | 4,810 | 2.22 | 1.92 | 2.02 | 1424 | 1071 | 1175 | 54 |
| 2806 | 2929 | 8,860 | 55.0 | 65.7 | 140.1 | 2045 | 1864 | 4,349 | 2.29 | 2.00 | 2.10 | 1369 | 1043 | 1142 | 55 |
| 2450 | 2548 | 5,723 | 53.2 | 63.4 | 135.9 | 1820 | 1653 | 3,889 | 3.00 | 2.62 | 2.74 | 1308 | 997 | 1095 | 56 |
| 2125 | 2219 | 4,915 | 50.2 | 60.2 | 127.6 | 1535 | 1394 | 3,227 | 4.24 | 3.69 | 3.85 | 1254 | 948 | 1036 | 57 |
| 1774 | 1849 | 4,133 | 47.2 | 56.9 | 121.4 | 1320 | 1190 | 2,787 | 11.09 | 9.60 | 10.05 | 1207 | 904 | 991 | 58 |
| 1137 | 1212 | 8,183 | 25.5 | 29.2 | 171.9 | 1365 | 1353 | 10,472 | 1.35 | 1.26 | 1.44 | 1476 | 1275 | 1677 | 59 |
| 1116 | 1190 | 8,005 | 25.3 | 29.0 | 170.6 | 1292 | 1281 | 9,877 | 1.33 | 1.24 | 1.42 | 1434 | 1241 | 1629 | 60 |
| 1055 | 1125 | 7,568 | 25.1 | 28.8 | 169.4 | 1222 | 1211 | 9,325 | 1.34 | 1.24 | 1.42 | 1387 | 1198 | 1570 | 61 |
| 1014 | 1081 | 7,298 | 24.9 | 28.6 | 186.2 | 1144 | 1132 | 8,759 | 1.29 | 1.20 | 1.37 | 1349 | 1163 | 1527 | 62 |
| ---- | ---- | ------ | ---- | ---- | ----- | 1147 | ---- | ------- | ---- | ---- | ---- | ---- | ---- | ---- | 63 |
| 931 | 995 | 6,700 | 24.1 | 27.7 | 163.2 | 1057 | 1049 | 8,089 | 1.33 | 1.23 | 1.41 | 1304 | 1124 | 1474 | 64 |
| 874 | 925 | 6,227 | 23.8 | 27.1 | 159.2 | 984 | 968 | 7,460 | 1.33 | 1.24 | 1.41 | 1267 | 1097 | 1434 | 65 |
| 857 | 916 | 6,025 | 23.1 | 26.5 | 152.6 | 894 | 889 | 6,671 | 1.34 | 1.24 | 1.42 | 1232 | 1066 | 1390 | 66 |
| 1853 | 1960 | 9,977 | 34.1 | 37.1 | 171.5 | 1725 | 1776 | 9,955 | 1.51 | 1.47 | 1.62 | 1452 | 1375 | 1668 | 67 |
| 1808 | 1920 | 9,711 | 34.1 | 37.1 | 170.8 | 1690 | 1676 | 9,329 | 1.48 | 1.44 | 1.59 | 1403 | 1332 | 1612 | 68 |
| 1738 | 1839 | 9,335 | 33.8 | 36.7 | 169.5 | 1510 | 1556 | 8,696 | 1.46 | 1.42 | 1.57 | 1353 | 1284 | 1555 | 69 |
| 1671 | 1768 | 8,952 | 33.7 | 36.6 | 168.3 | 1410 | 1454 | 8,100 | 1.46 | 1.42 | 1.56 | 1308 | 1242 | 1503 | 70 |
| 1601 | 1683 | 8,554 | 33.4 | 36.1 | 166.5 | 1320 | 1349 | 7,560 | 1.46 | 1.42 | 1.56 | 1268 | 1201 | 1457 | 71 |
| 1500 | 1562 | 7,976 | 32.8 | 35.1 | 162.8 | 1225 | 1241 | 6,981 | 1.49 | 1.45 | 1.60 | 1223 | 1158 | 1405 | 72 |
| 681 | 765 | 8,376 | 14.6 | 17.6 | 168.1 | 907 | 950 | 11,919 | 1.46 | 1.36 | 1.56 | 1570 | 1362 | 1791 | 73 |
| 727 | 803 | 8,789 | 14.9 | 17.7 | 169.2 | 864 | 889 | 11,159 | 1.30 | 1.21 | 1.40 | 1531 | 1328 | 1747 | 74 |
| 1459 | 1630 | 11,606 | 23.1 | 26.0 | 171.6 | 1253 | 1391 | 10,684 | 1.42 | 1.41 | 1.52 | 1513 | 1395 | 1738 | 75 |
| 1412 | 1567 | 11,232 | 23.1 | 25.9 | 171.8 | 1178 | 1296 | 10,039 | 1.41 | 1.39 | 1.51 | 1459 | 1433 | 1673 | 76 |
| 1380 | 1506 | 10,775 | 23.3 | 25.7 | 170.1 | 1104 | 1192 | 9,213 | 1.38 | 1.37 | 1.48 | 1409 | 1381 | 1610 | 77 |
| 1284 | 1418 | 10,100 | 23.0 | 25.5 | 168.7 | 1050 | 1151 | 8,857 | 1.48 | 1.47 | 1.58 | 1356 | 1339 | 1558 | 78 |
| 1226 | 1346 | 9,644 | 22.5 | 24.9 | 165.2 | 963 | 1050 | 8,118 | 1.44 | 1.43 | 1.55 | 1313 | 1293 | 1509 | 79 |
| 1191 | 1299 | 9,231 | 22.3 | 24.5 | 161.3 | 910 | 985 | 7,557 | 1.44 | 1.43 | 1.54 | 1271 | 1252 | 1458 | 80 |
| 1083 | 1217 | 8,648 | 21.0 | 23.7 | 156.3 | 812 | 907 | 6,947 | 1.45 | 1.44 | 1.56 | 1242 | 1226 | 1427 | 81 |

NACA

Figure 1. - Installation of YJ71-A-7 in altitude wind tunnel.
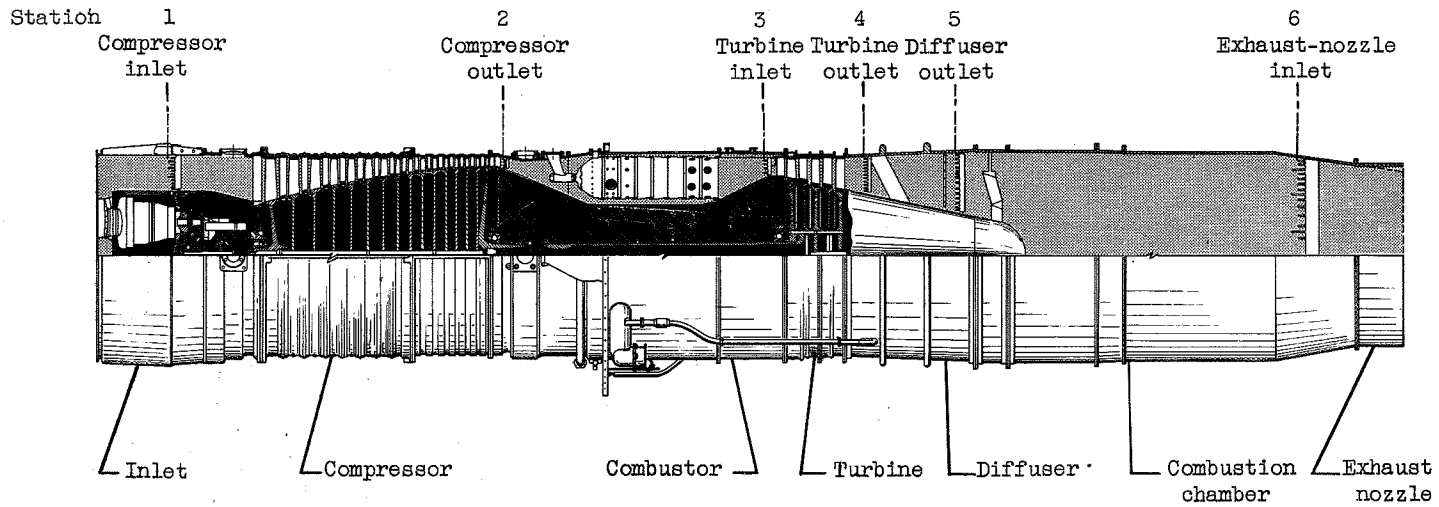
| Station | 1 | 2 | 3 | 4 | 5 | 6 |
| --- | --- | --- | --- | --- | --- | --- |
| | Compressor inlet | Compressor outlet | Turbine inlet | Turbine outlet | Diffuser outlet | Exhaust-nozzle inlet |

| Station | Pressure tubes | | | Thermo-couples |
| --- | --- | --- | --- | --- |
| | Total | Stream static | Wall static | |
| 1 | 28 | 8 | 4 | (a) |
| 2 | 8 | 1 | -- | 8 |
| 3 | 8 | -- | -- | 4 |
| 4 | 21 | -- | 6 | 18 |
| 5 | 12 | -- | 1 | -- |
| 6 | 20 | 4 | 2 | 12 |

(a) Six thermocouples located upstream of engine in inlet duct.

CD-3030

Figure 2. - Cross section of engine showing location of instrumentation.
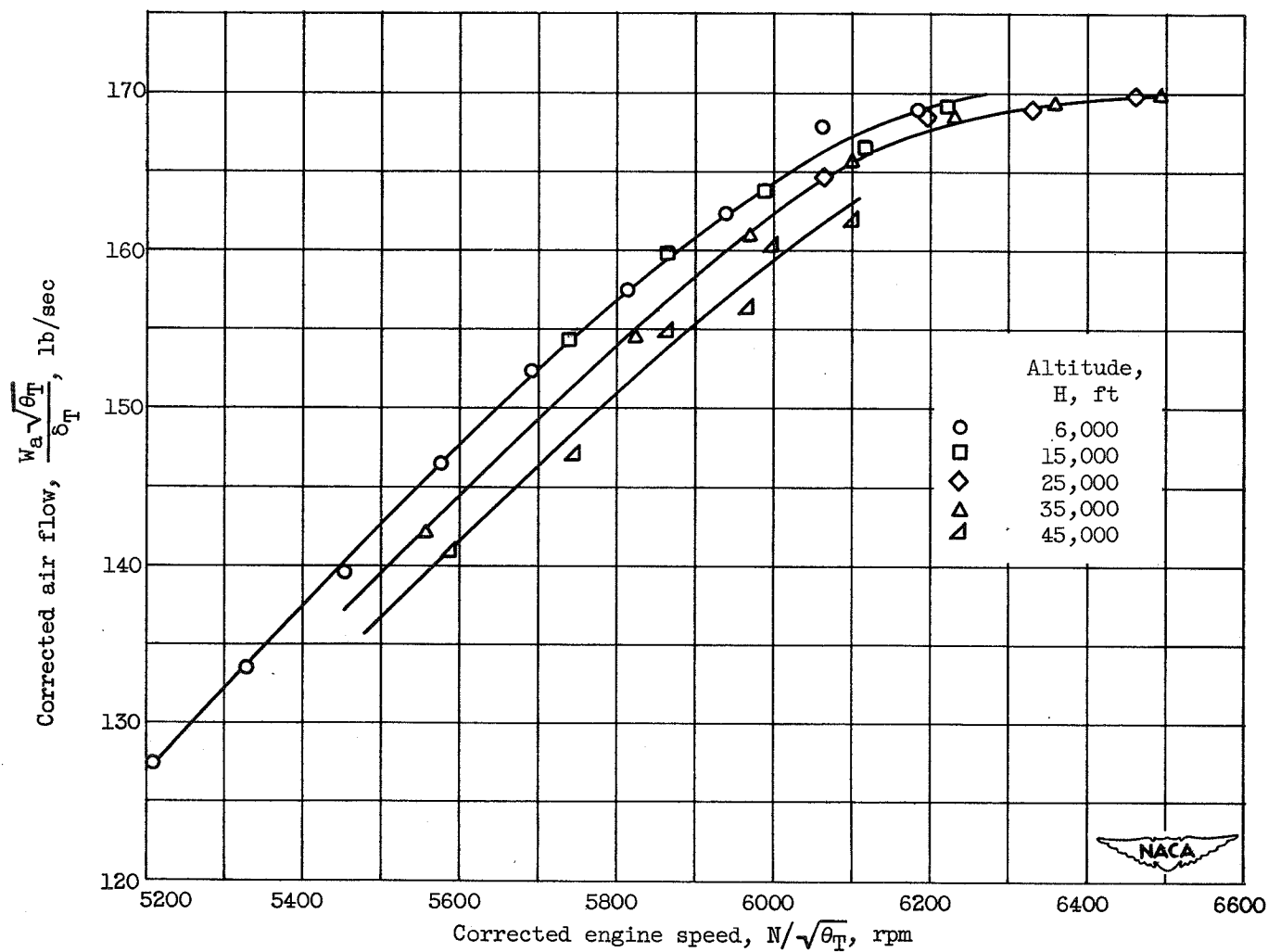
(a) Effect of altitude.  Flight Mach number, 0.16.

Figure 3. - Variation of corrected air flow with corrected engine speed.  Exhaust-nozzle area, 2.685 square feet.
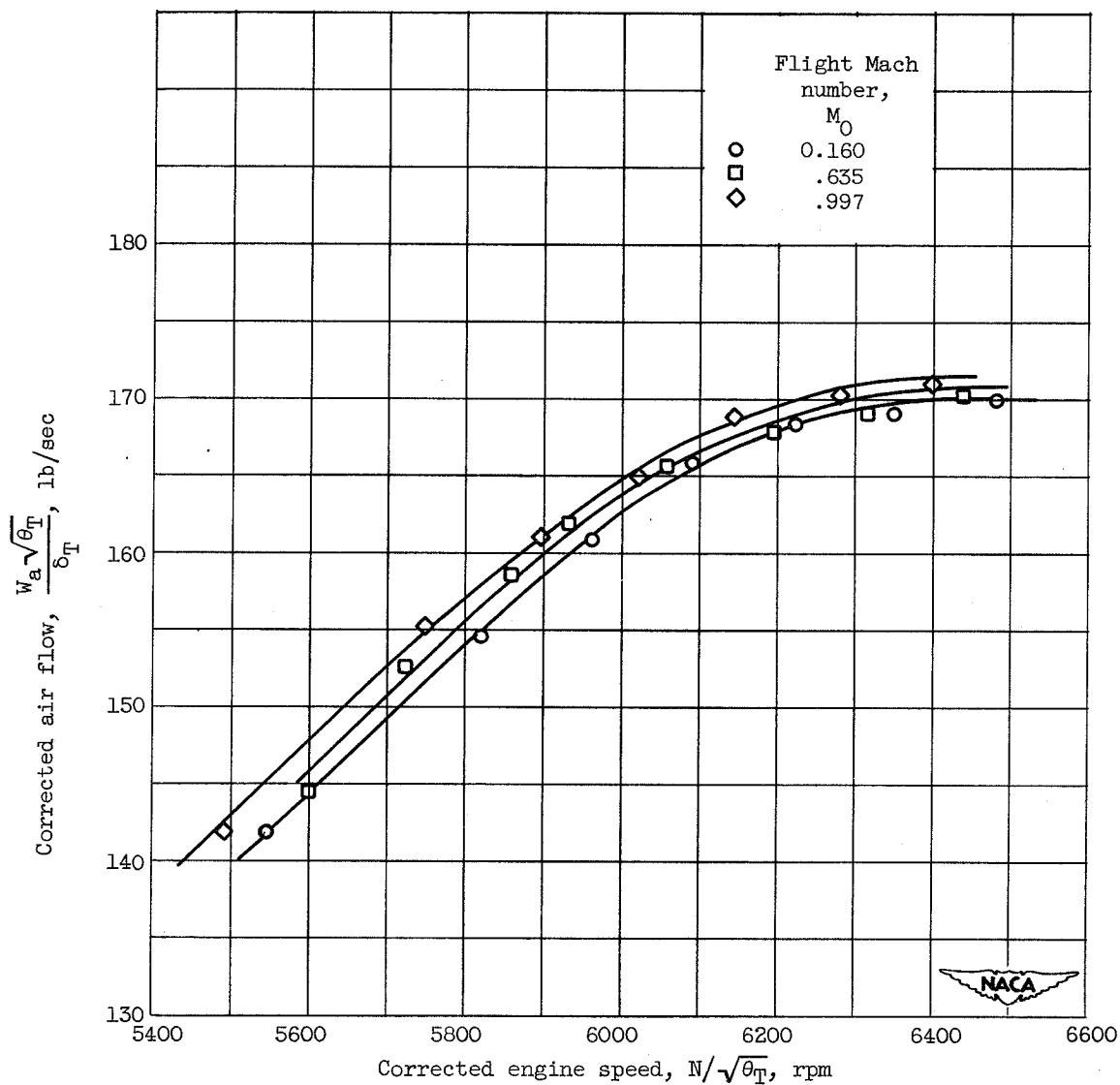
(b) Effect of flight Mach number.  Altitude, 35,000 feet.

Figure 3. - Concluded.  Variation of corrected air flow with corrected
    engine speed.  Exhaust-nozzle area, 2.685 square feet.
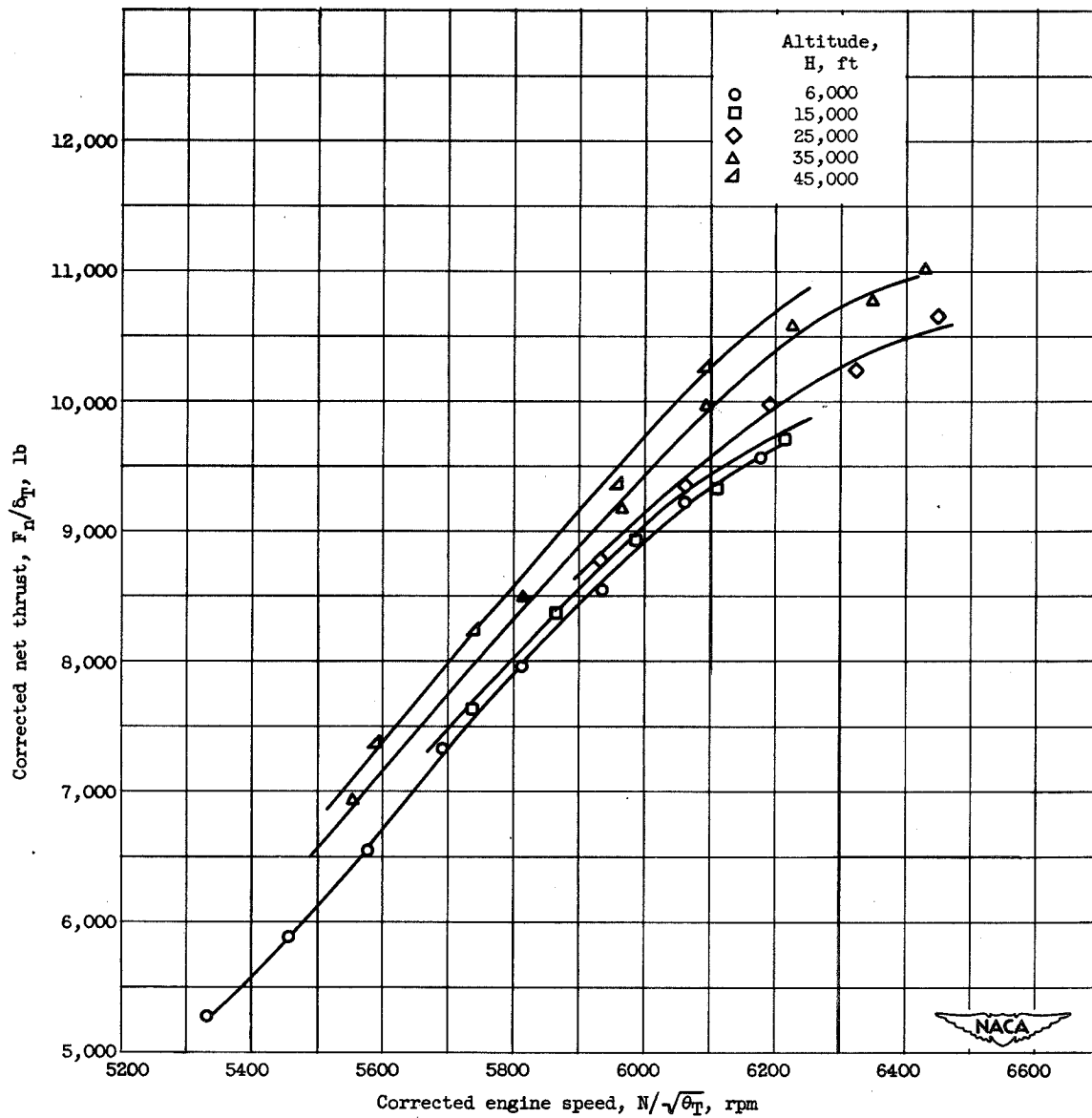
Figure 4. - Effect of altitude on variation of corrected net thrust with corrected engine speed.  Flight Mach number, 0.16; exhaust-nozzle area, 2.685 square feet.
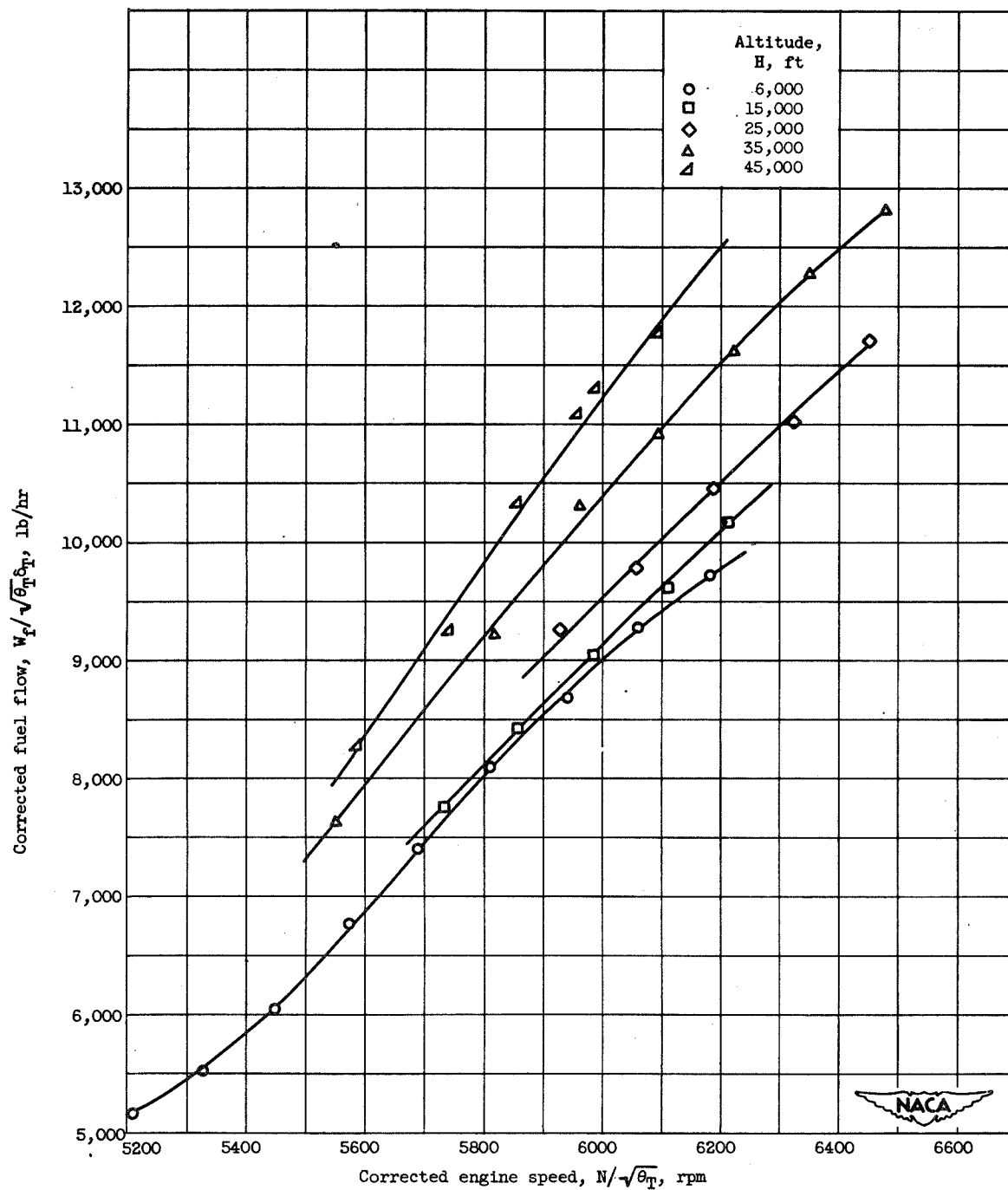
Figure 5. - Effect of altitude on variation of corrected fuel flow with corrected engine speed. Flight Mach number, 0.16; exhaust-nozzle area, 2.685 square feet.
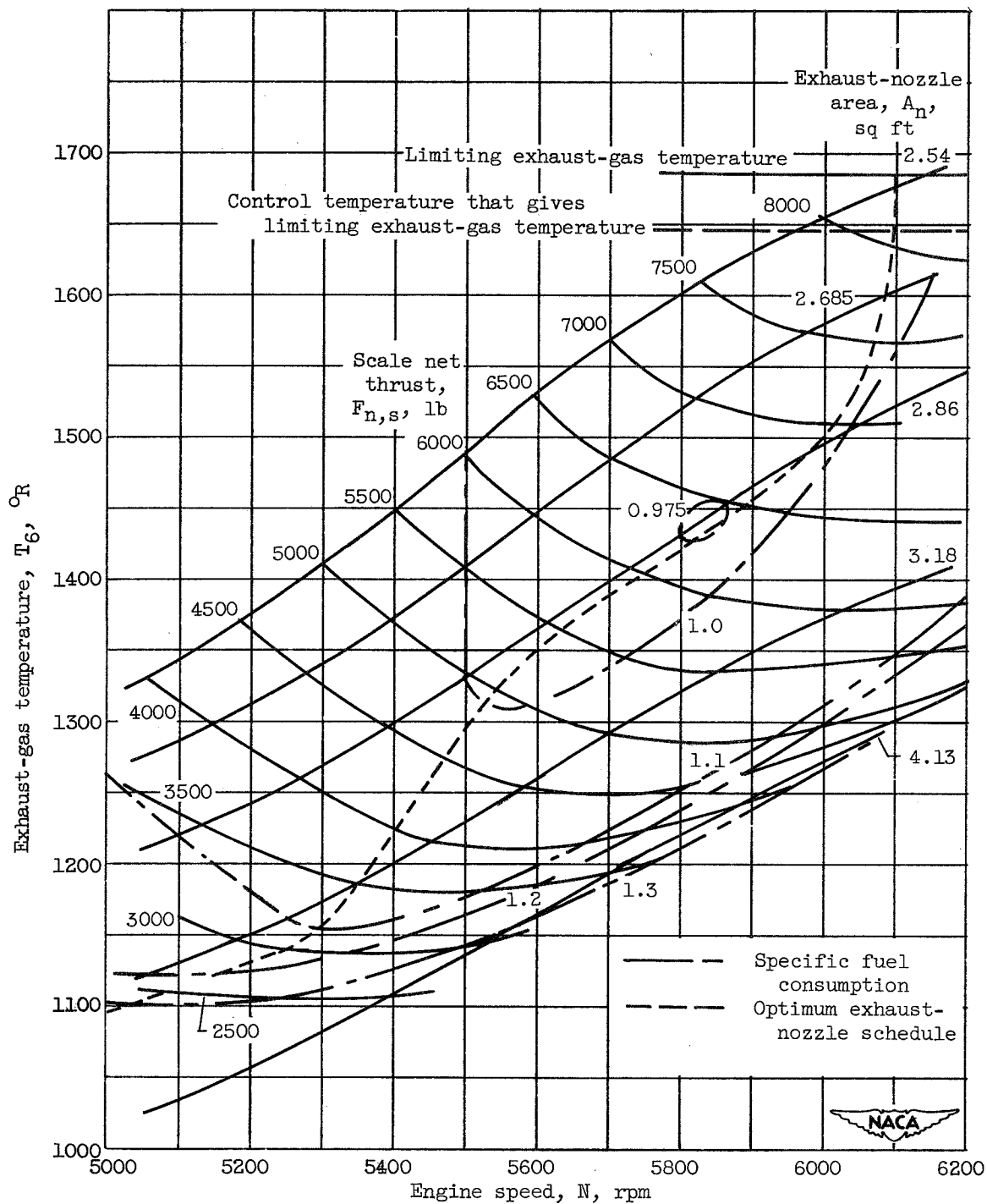
(a) Altitude, 6000 feet; flight Mach number, 0.159.

Figure 6. - Engine performance maps.
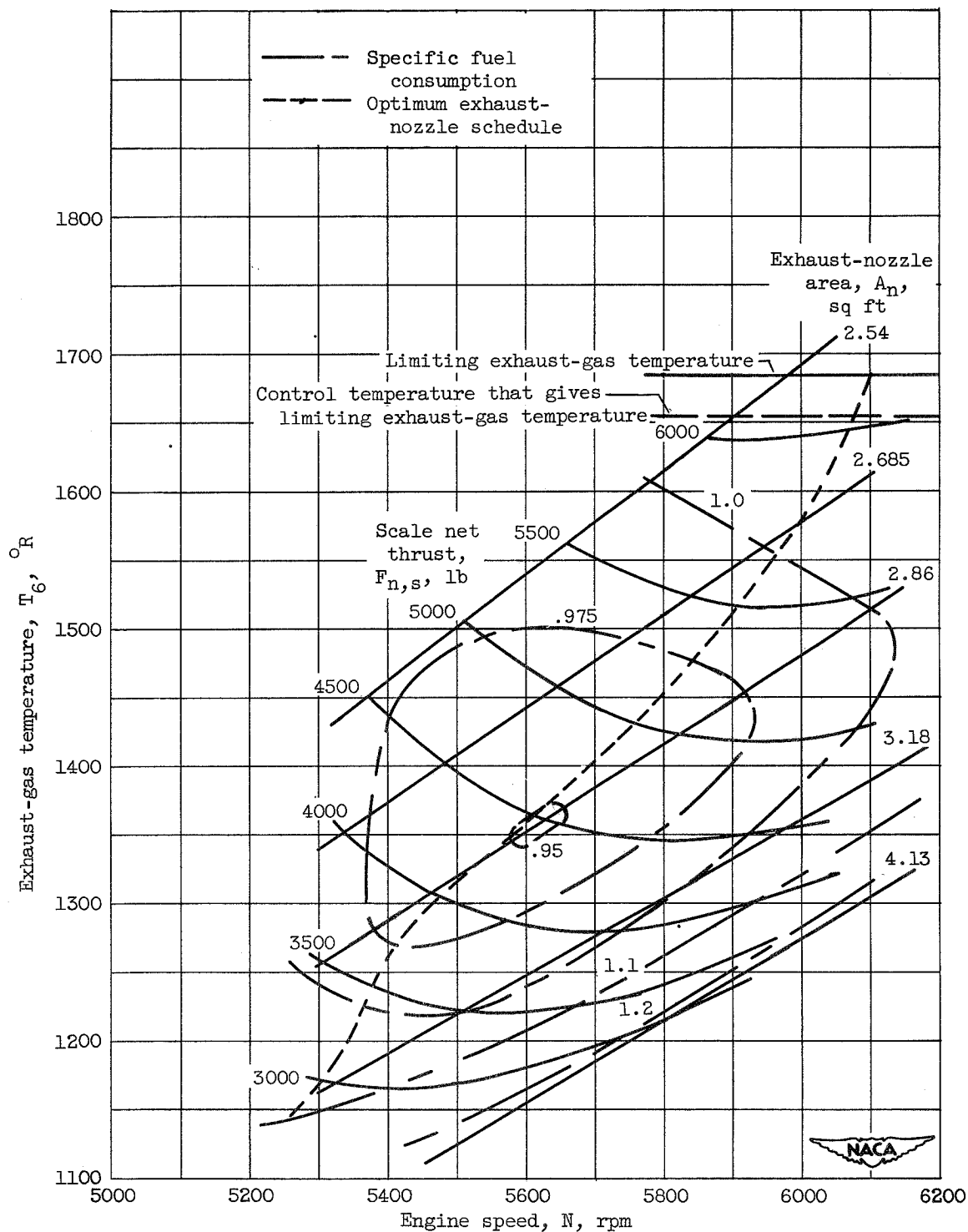
(b) Altitude, 15,000 feet; flight Mach number, 0.173.

Figure 6. - Continued. Engine performance maps.
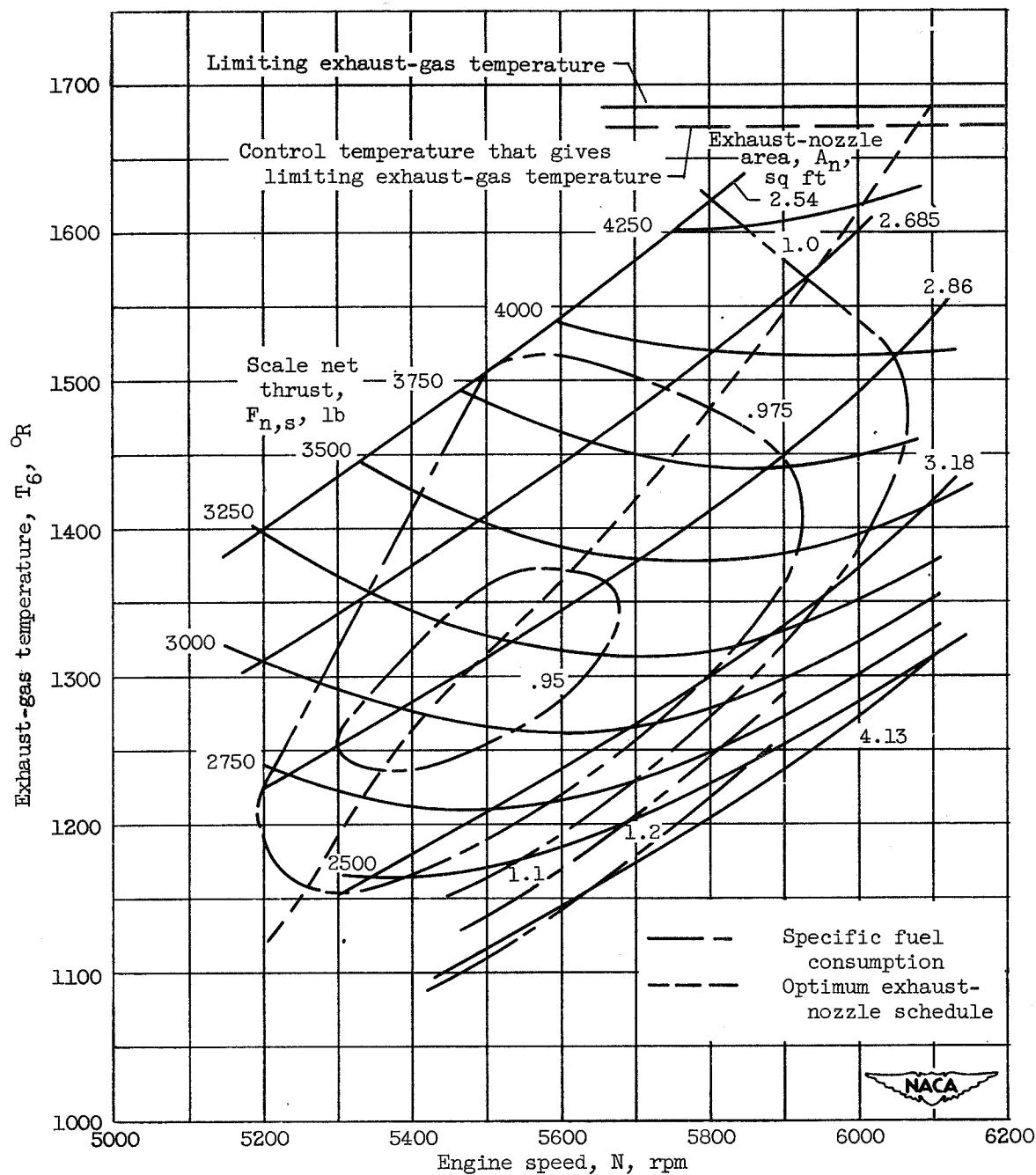
(c) Altitude, 25,000 feet; flight Mach number, 0.163.

Figure 6. - Continued.  Engine performance maps.
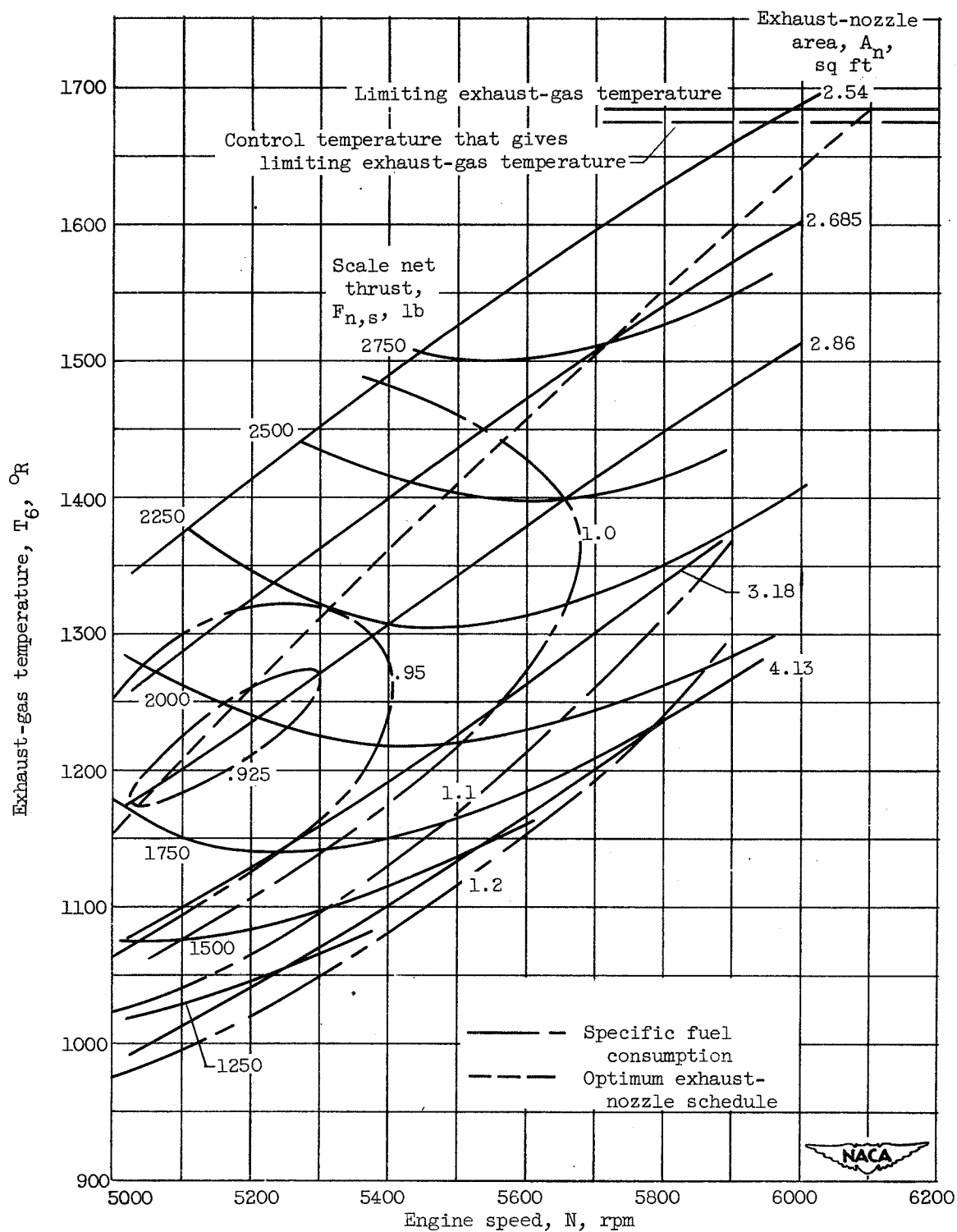
(d) Altitude, 35,000 feet; flight Mach number, 0.160.

Figure 6. - Continued.  Engine performance maps.
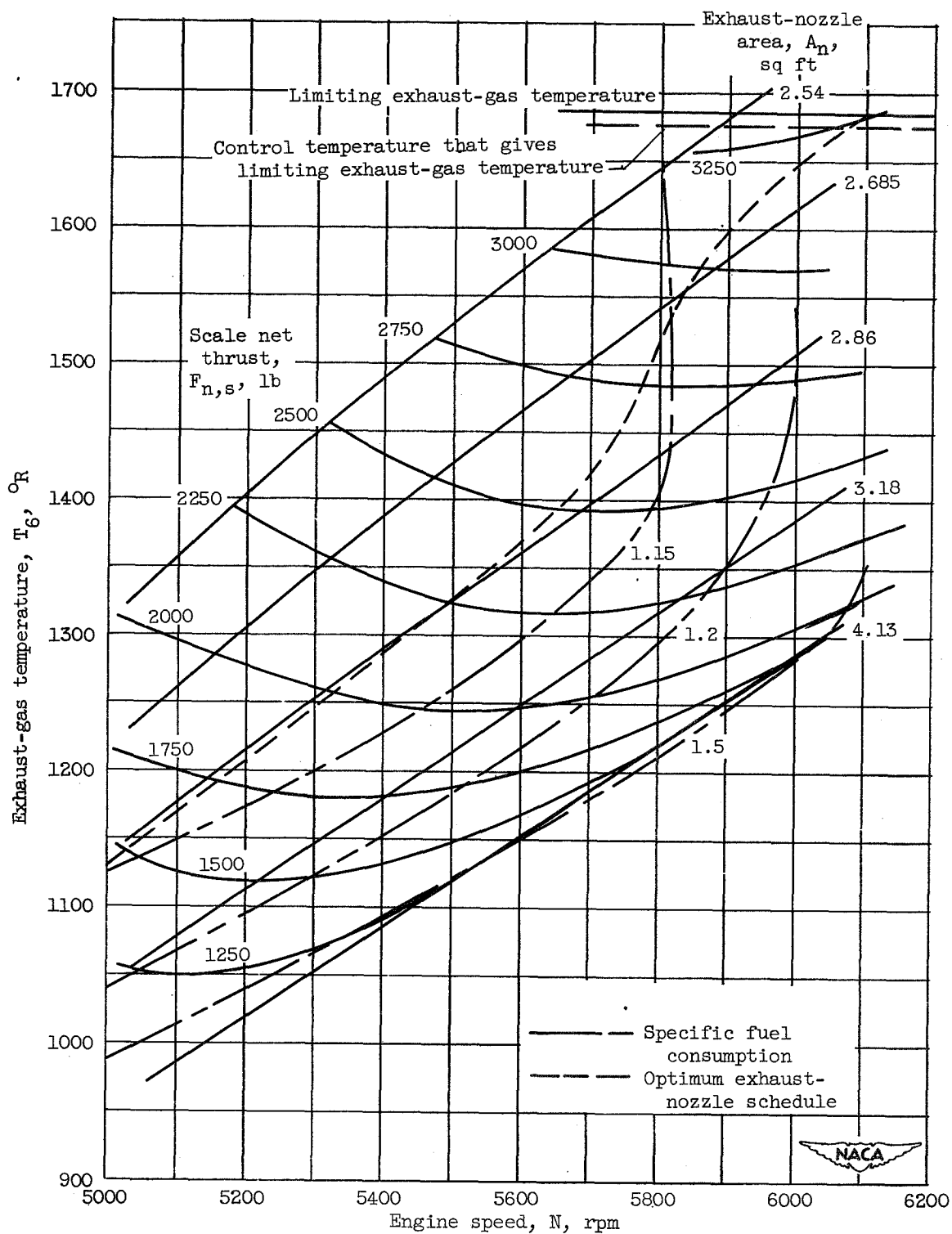
(e) Altitude, 35,000 feet; flight Mach number, 0.635.

Figure 6. - Continued.  Engine performance maps.
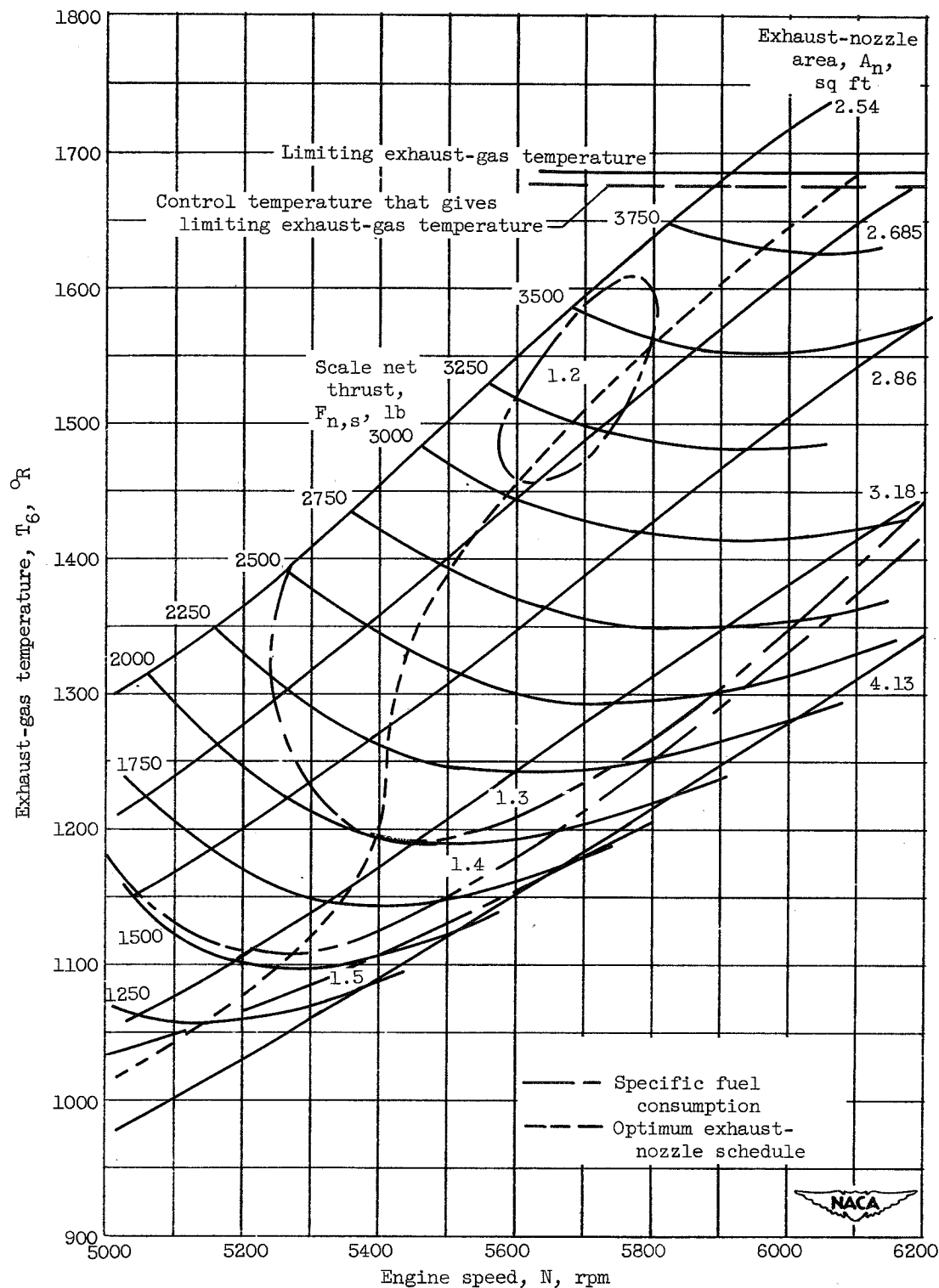
(f) Altitude, 35,000 feet; flight Mach number, 0.997.

Figure 6. - Continued.  Engine performance maps.
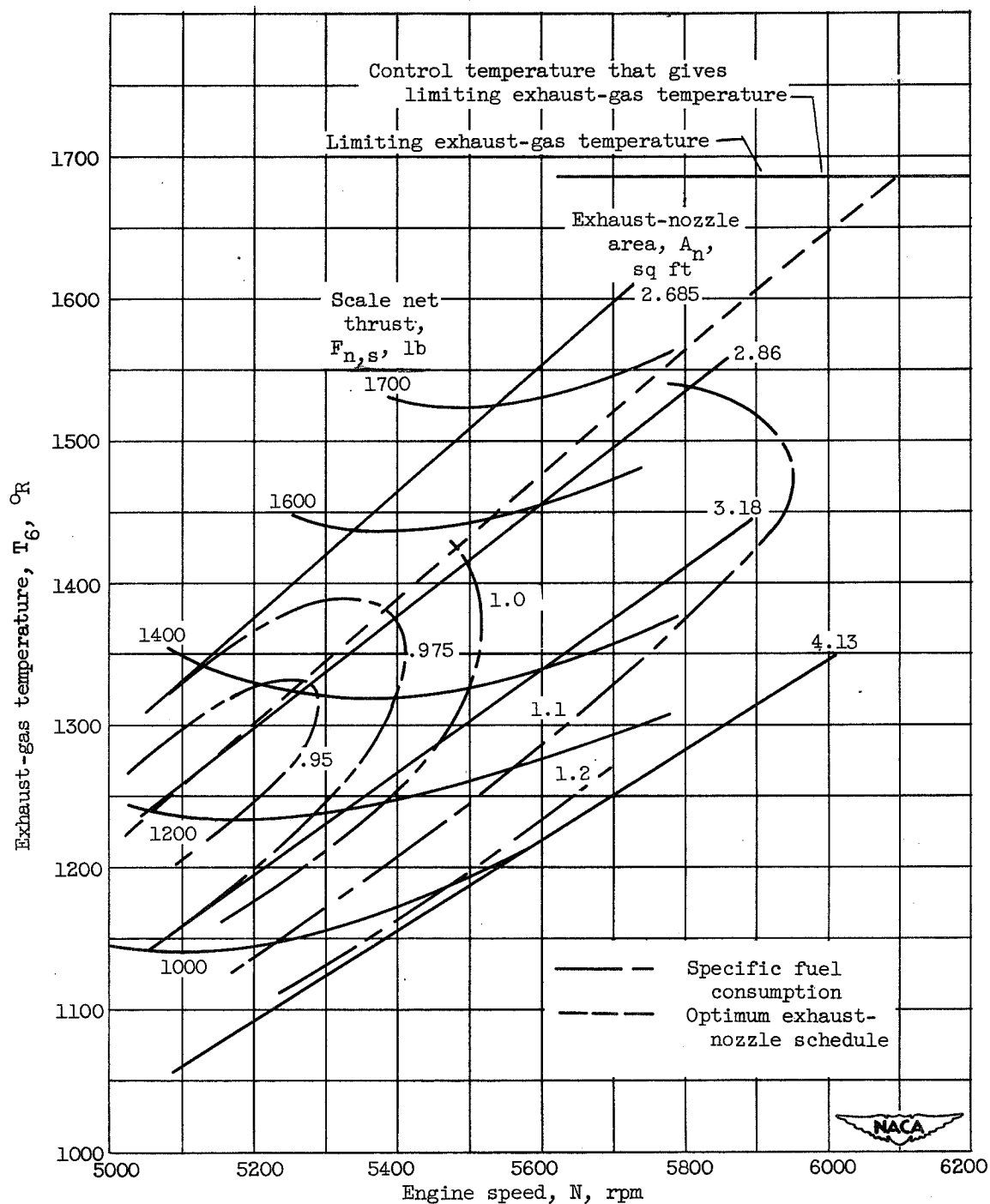
(g) Altitude, 45,000 feet; flight Mach number, 0.168.

Figure 6. - Continued.  Engine performance maps.
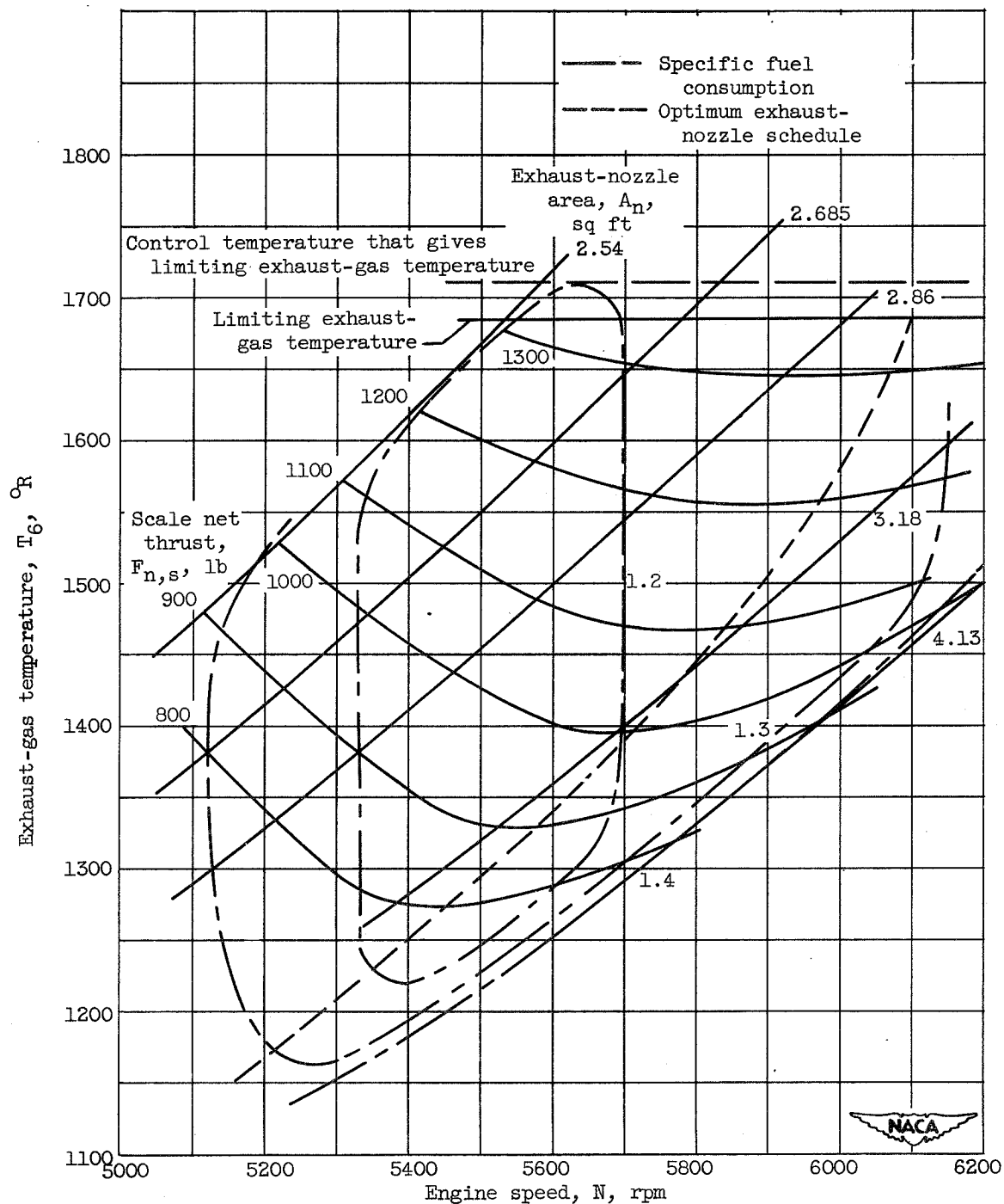
(h) Altitude, 55,000 feet; flight Mach number, 0.824.

Figure 6. - Concluded.  Engine performance maps.
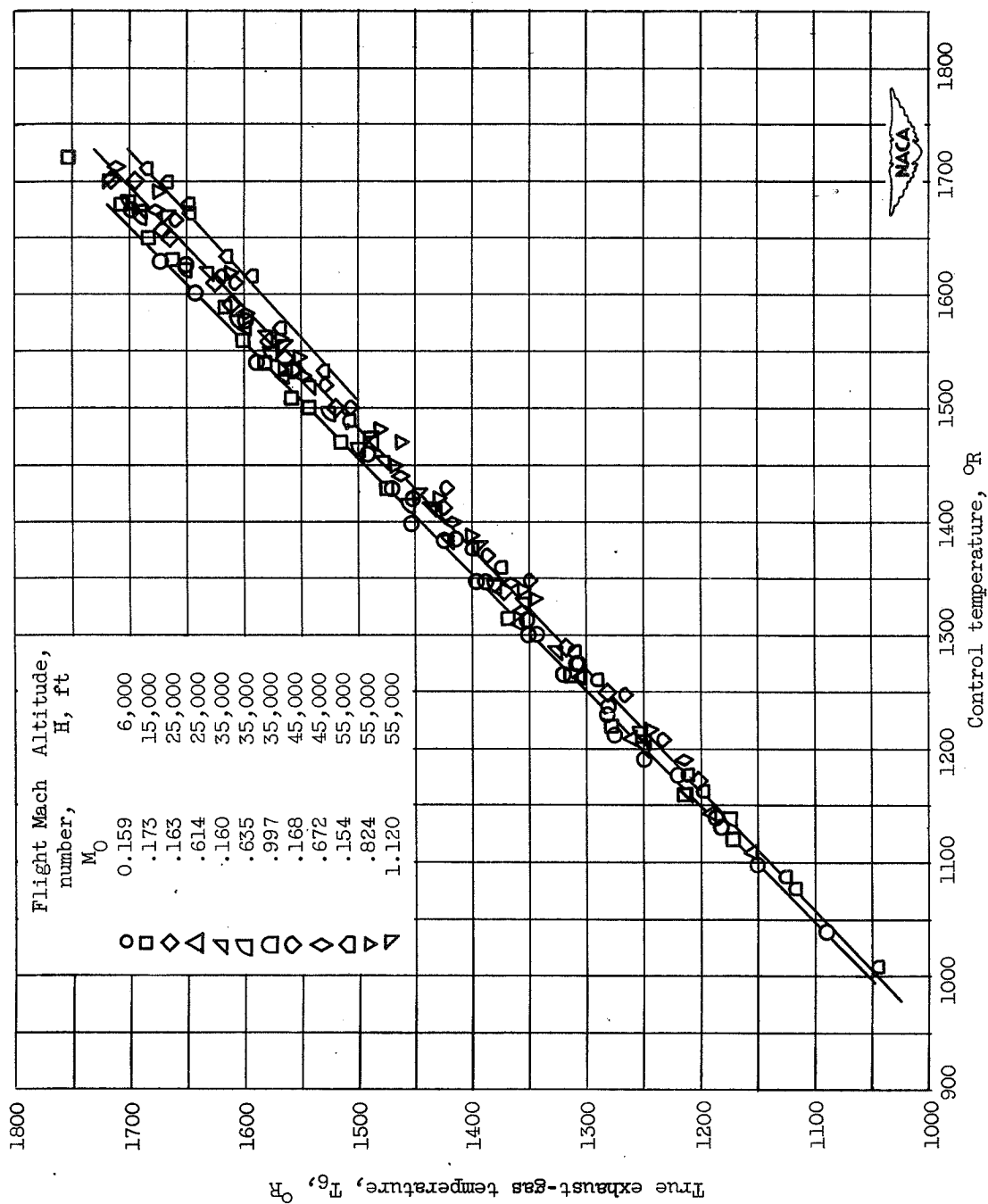
Figure 7. – Error in control temperature with flight condition.
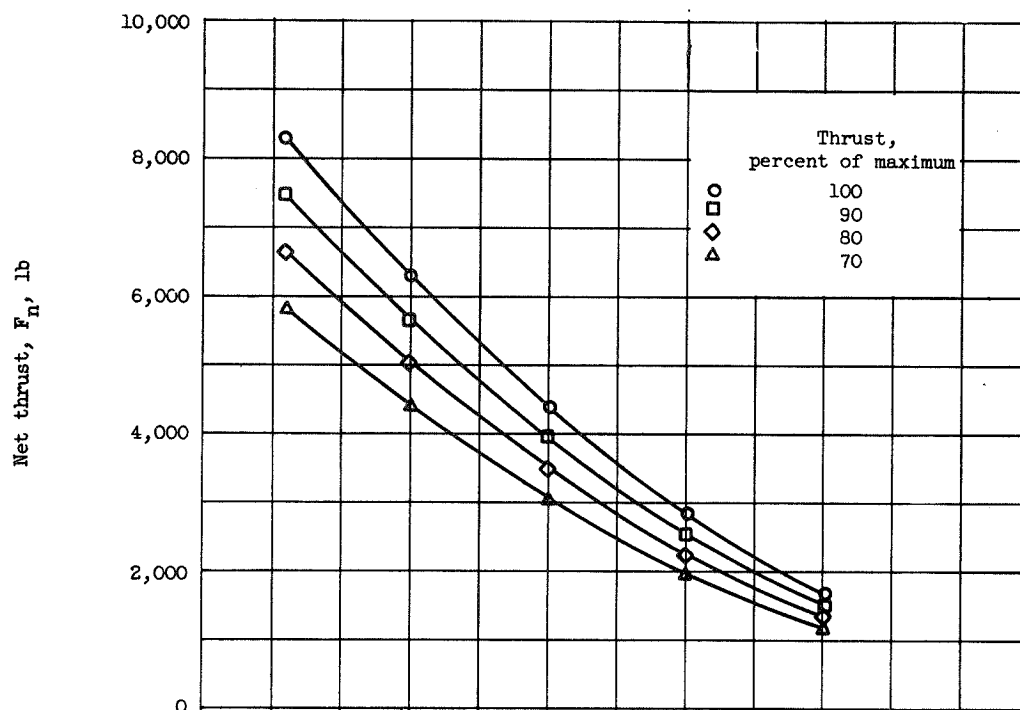
(a) Net-thrust values for methods shown in (b) and (d).
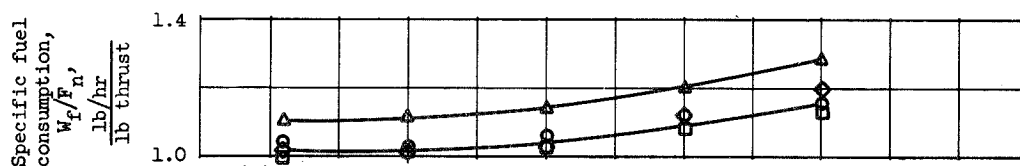
(b) Specific fuel consumption obtained at rated speed (6100 rpm) by varying exhaust-nozzle area.
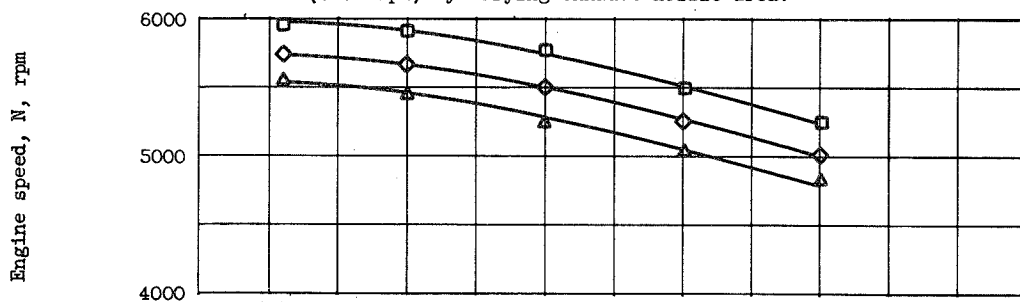
(c) Speed required to obtain thrust shown in (a) at constant exhaust-nozzle area (2.685 sq ft).
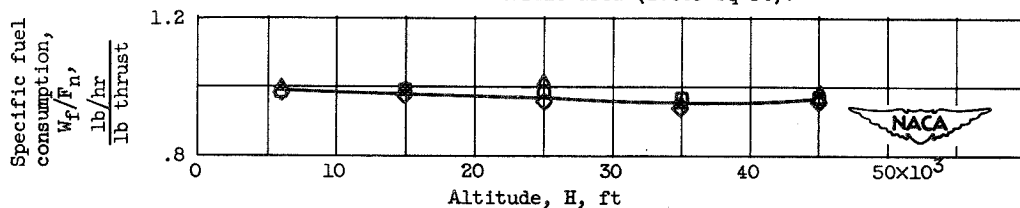
(d) Specific fuel consumption obtained at constant exhaust-nozzle area (2.685 sq ft) by varying speed.

Figure 8. - Effect of altitude on specific fuel consumption for two methods of thrust modulation at flight Mach number of 0.16.
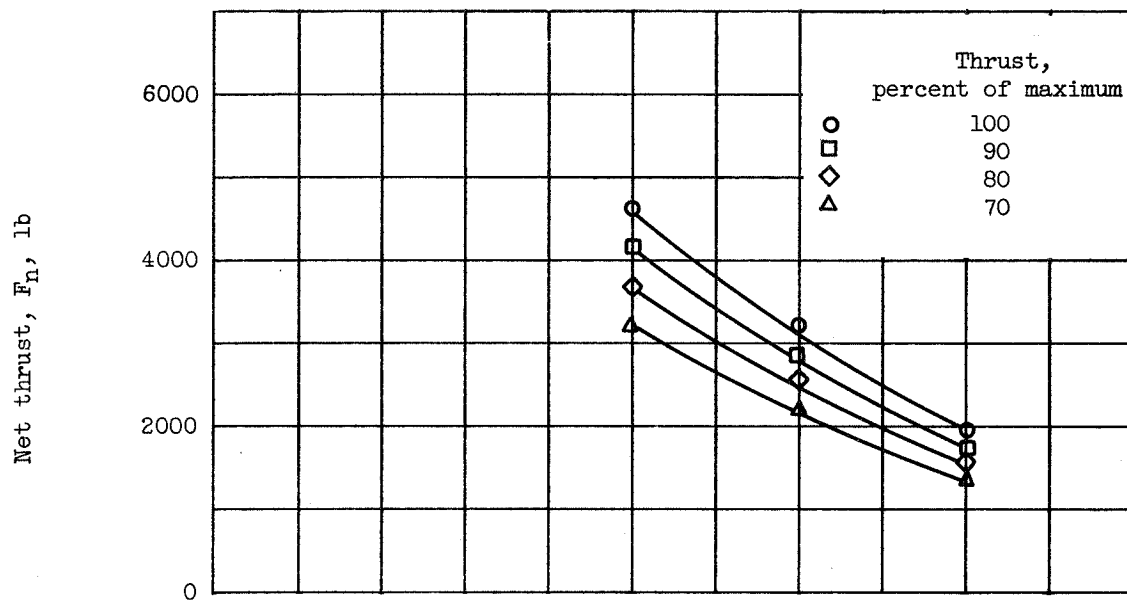
(a) Net thrust values for methods shown in (b) and (d).
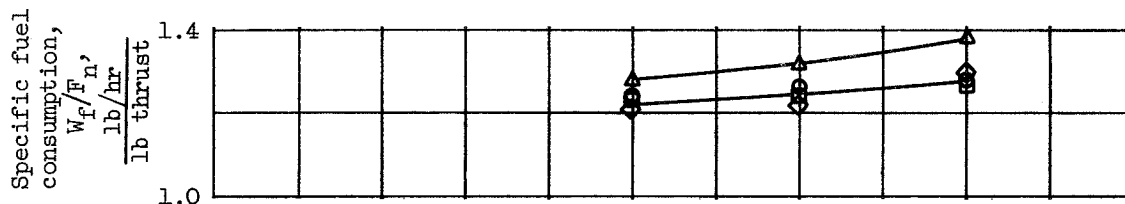
(b) Specific fuel consumption obtained at rated speed (6100 rpm) by varying exhaust-nozzle area.
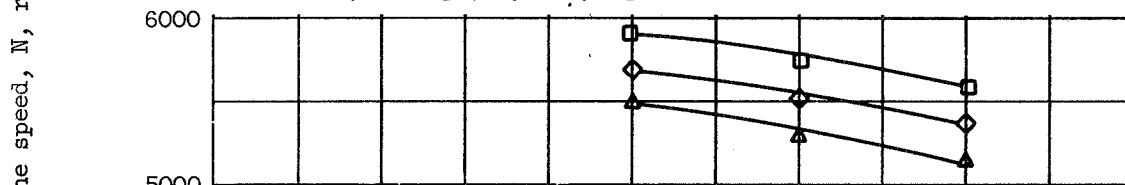
(c) Speed required to obtain thrust shown in (a) at constant exhaust-nozzle area (2.685 sq ft).
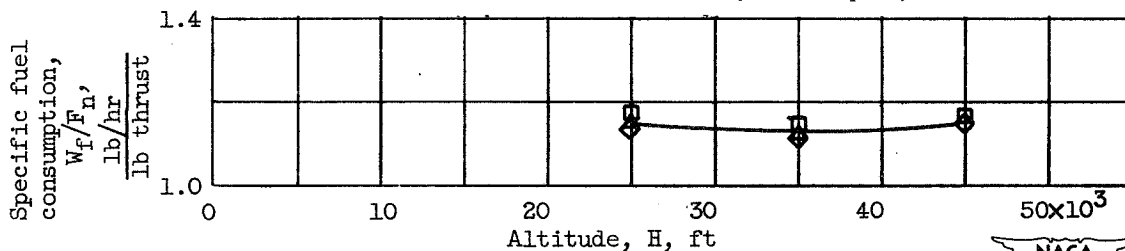
(d) Specific fuel consumption obtained at constant exhaust-nozzle area (2.685 sq ft) by varying speed.

Figure 9. - Effect of altitude on specific fuel consumption for two methods of thrust modulation at flight Mach number of 0.64.
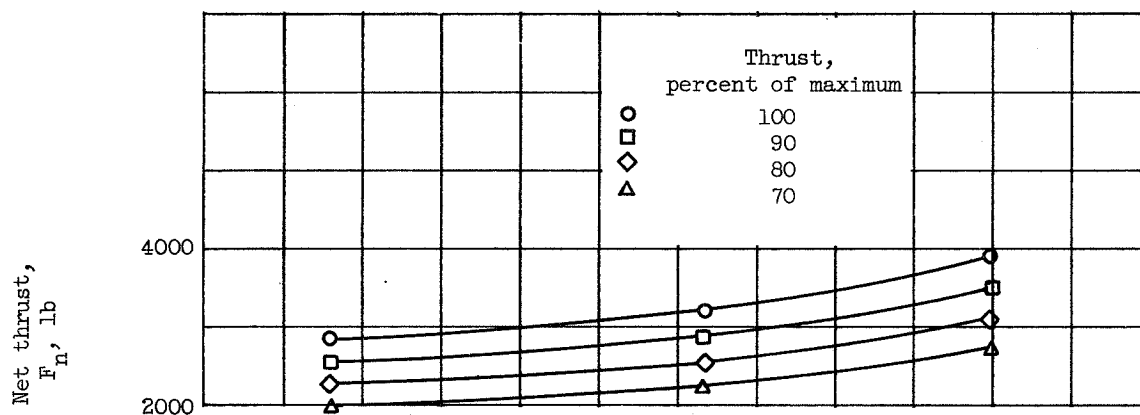
(a) Net-thrust values for methods shown in (b) and (d).
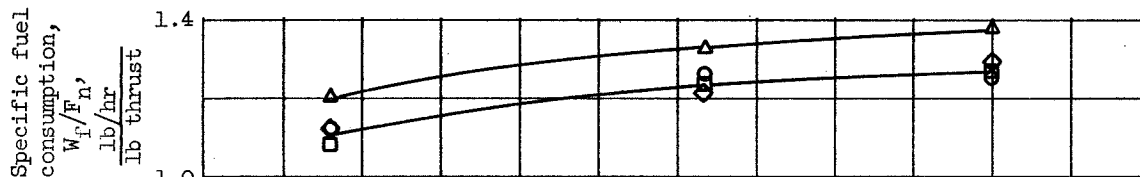
(b) Specific fuel consumption obtained at rated speed
(6100 rpm) by varying exhaust-nozzle area.
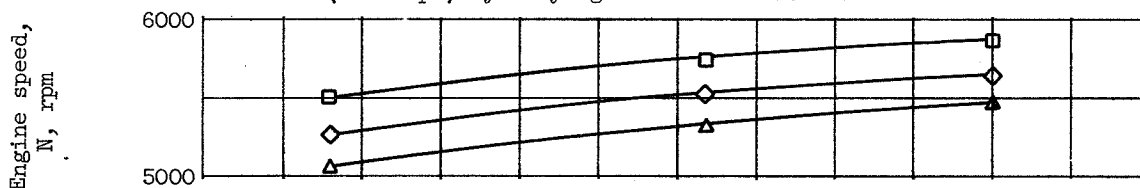
(c) Speed required to obtain thrust shown in (a) at
constant exhaust-nozzle area (2.685 sq ft).
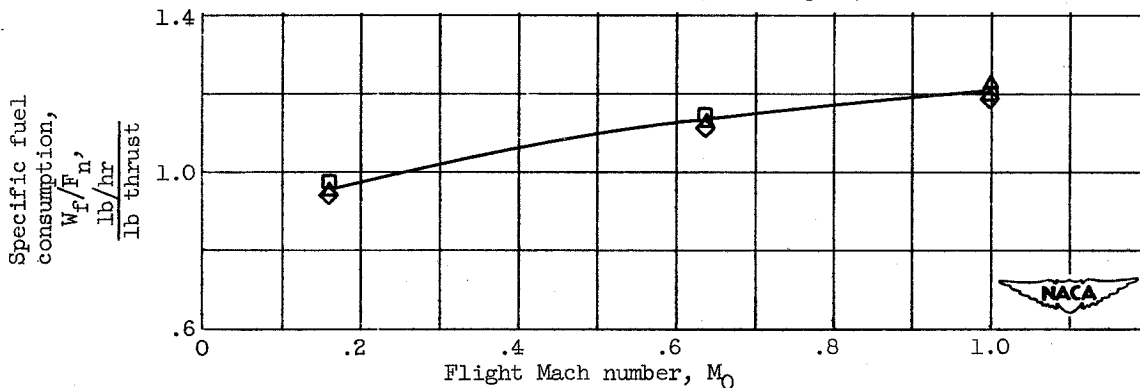
(d) Specific fuel consumption obtained at constant exhaust-
nozzle area (2.685 sq ft) by varying speed.

Figure 10. - Effect of flight Mach number on specific fuel con-
sumption for two methods of thrust modulation at an altitude
of 35,000 feet.
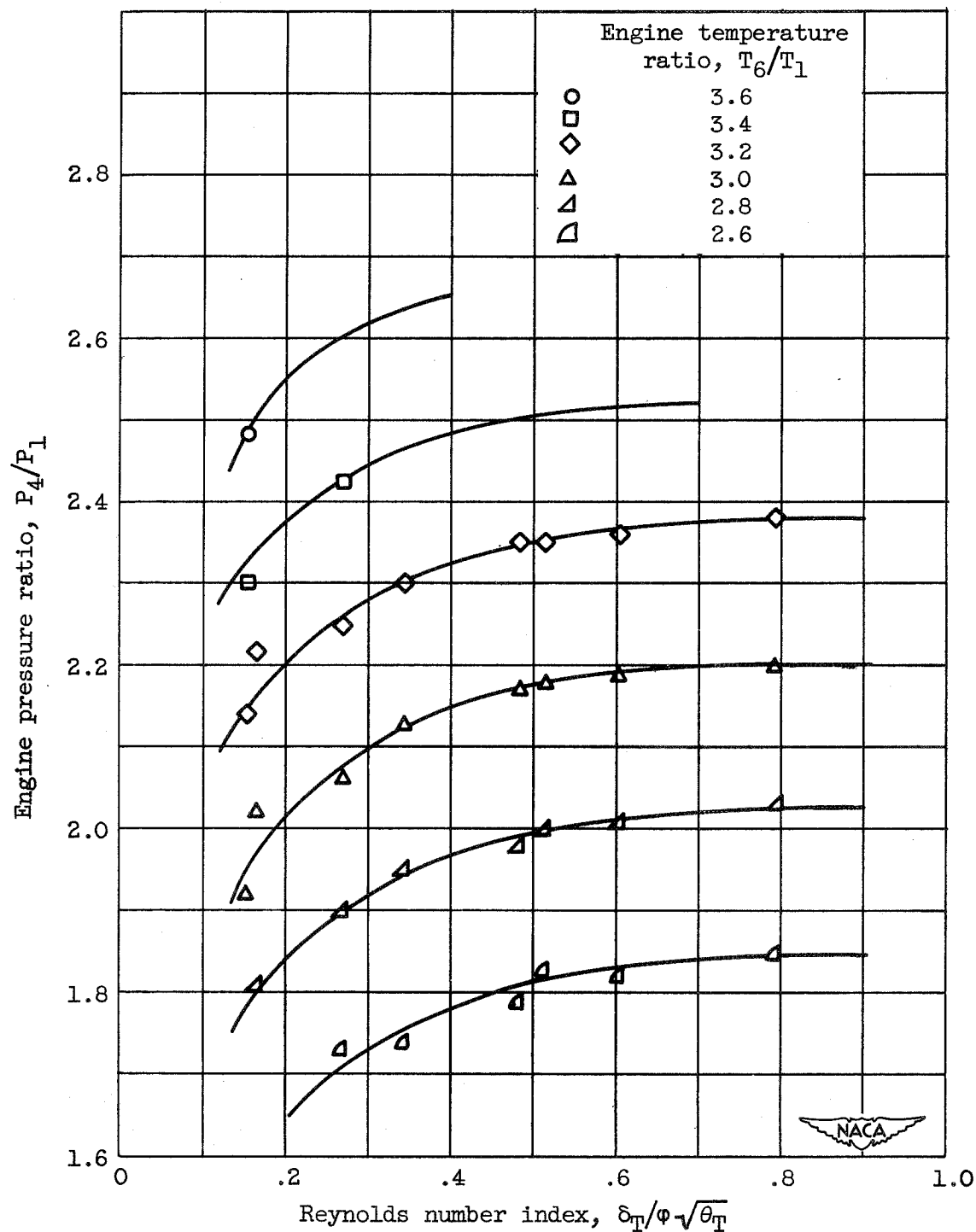
(a) Corrected engine speed, 5800 rpm.

Figure 11. - Variation of engine pressure ratio with Reynolds
   number index for various corrected engine speeds and engine
   temperature ratios.
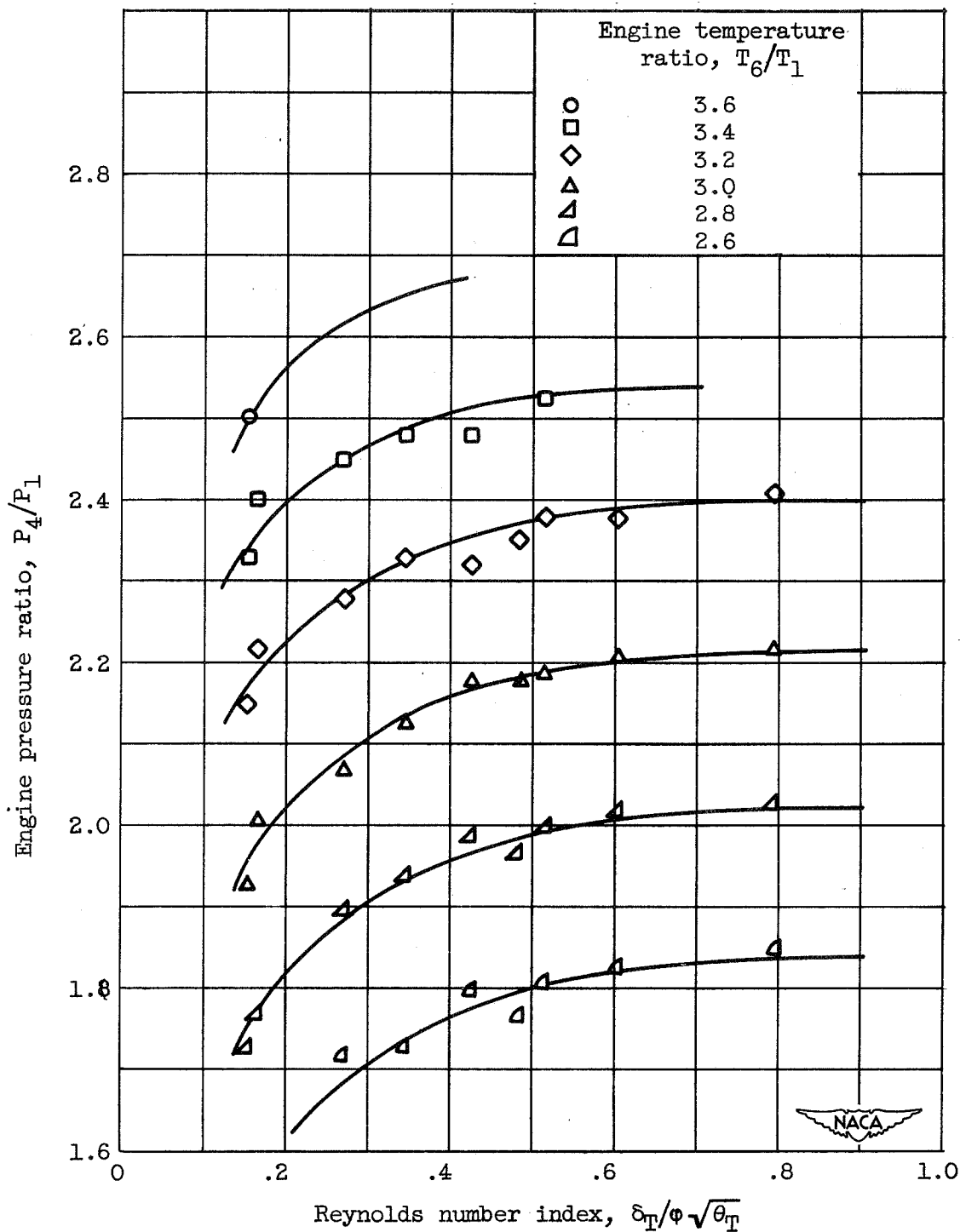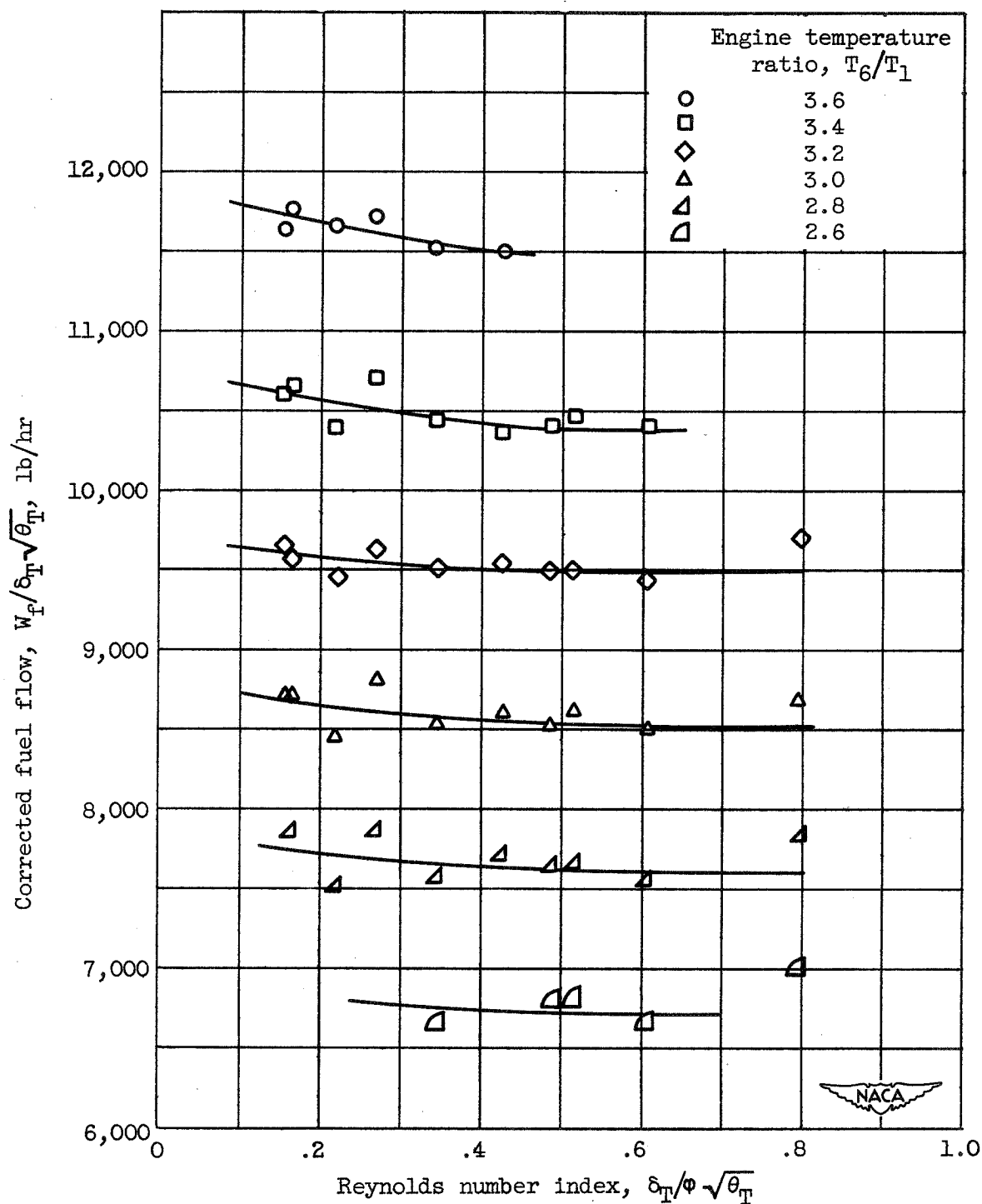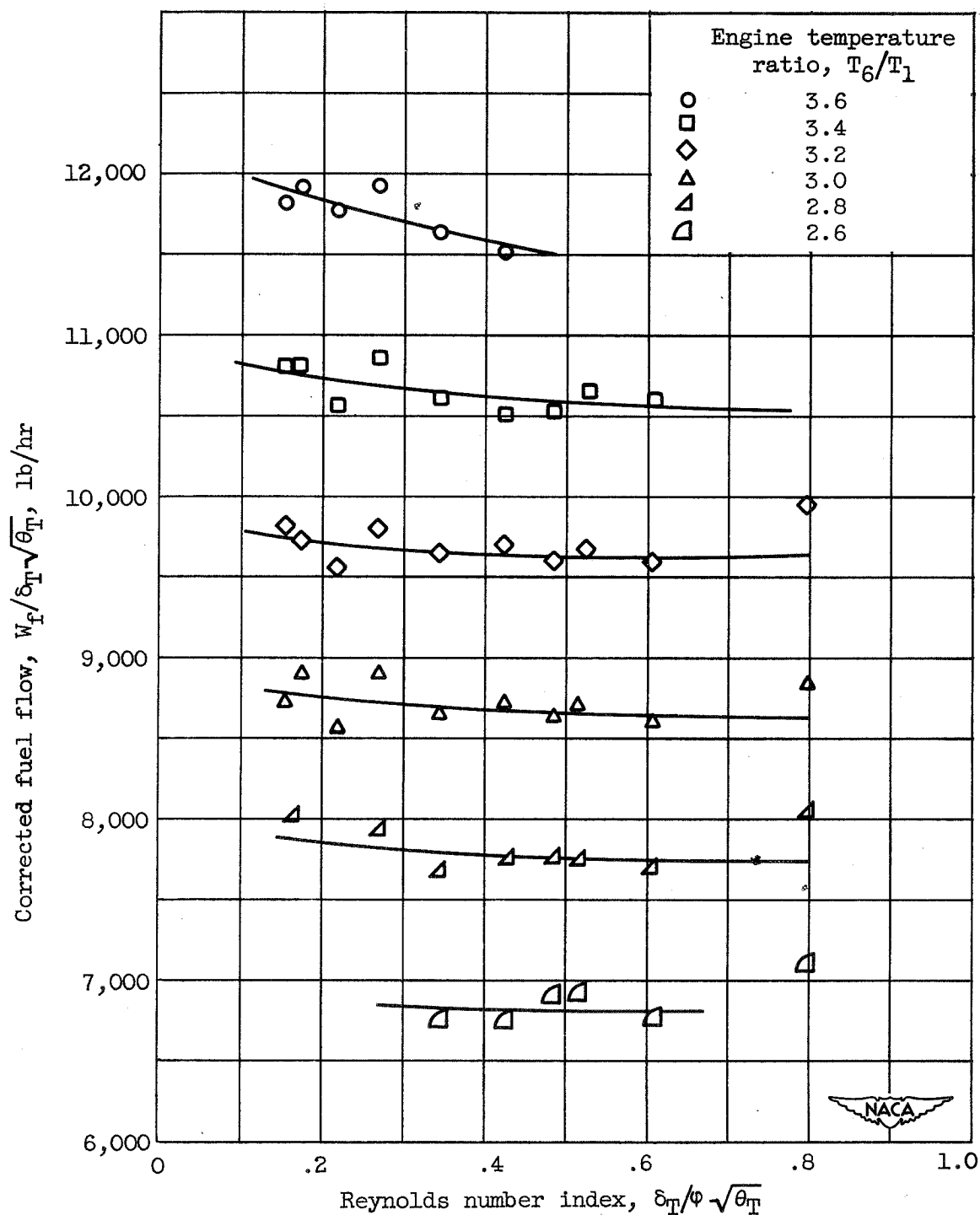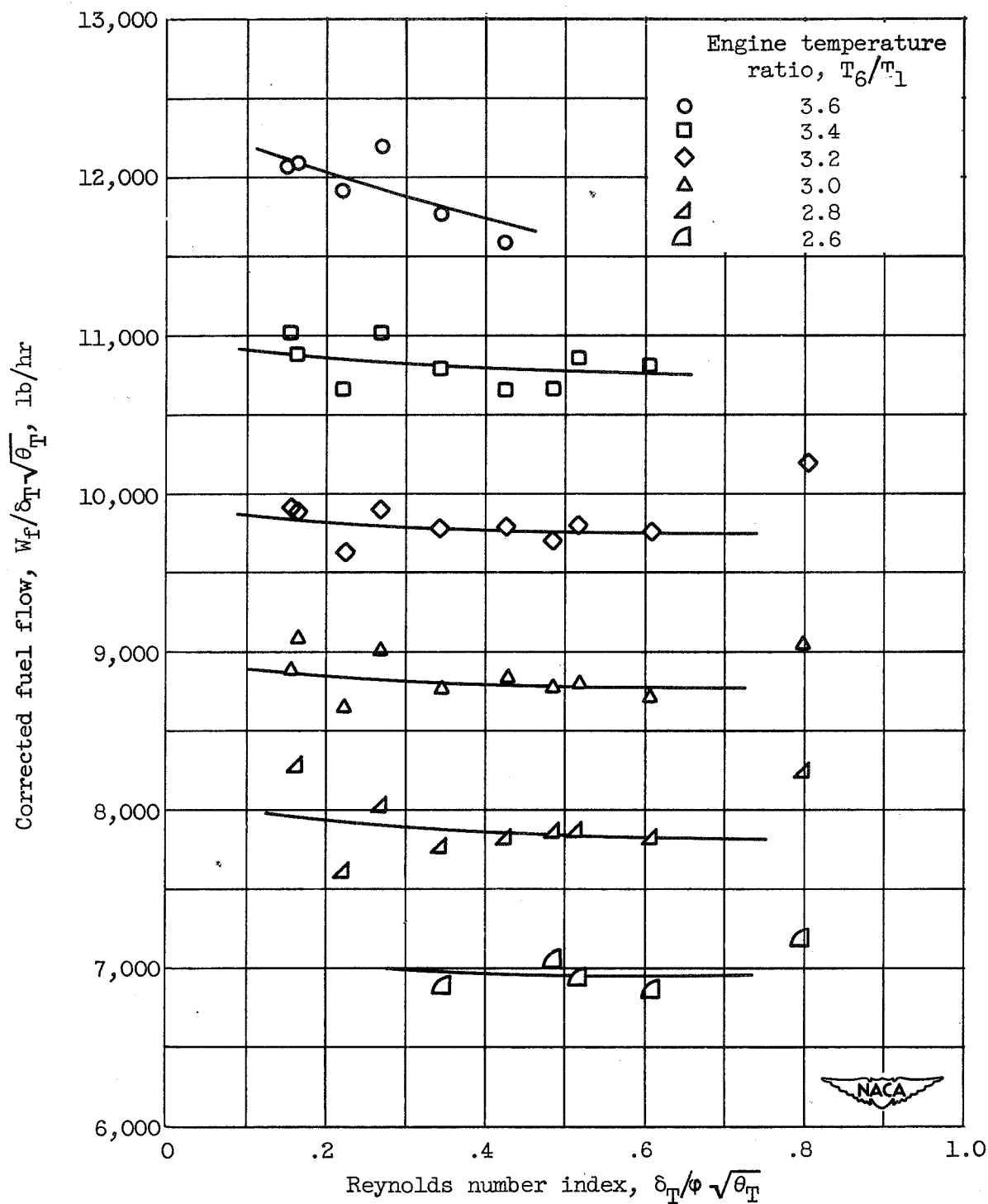
(b) Corrected engine speed, 5900 rpm.

Figure 11. - Continued.  Variation of engine pressure ratio with
Reynolds number index for various corrected engine speeds and
engine temperature ratios.
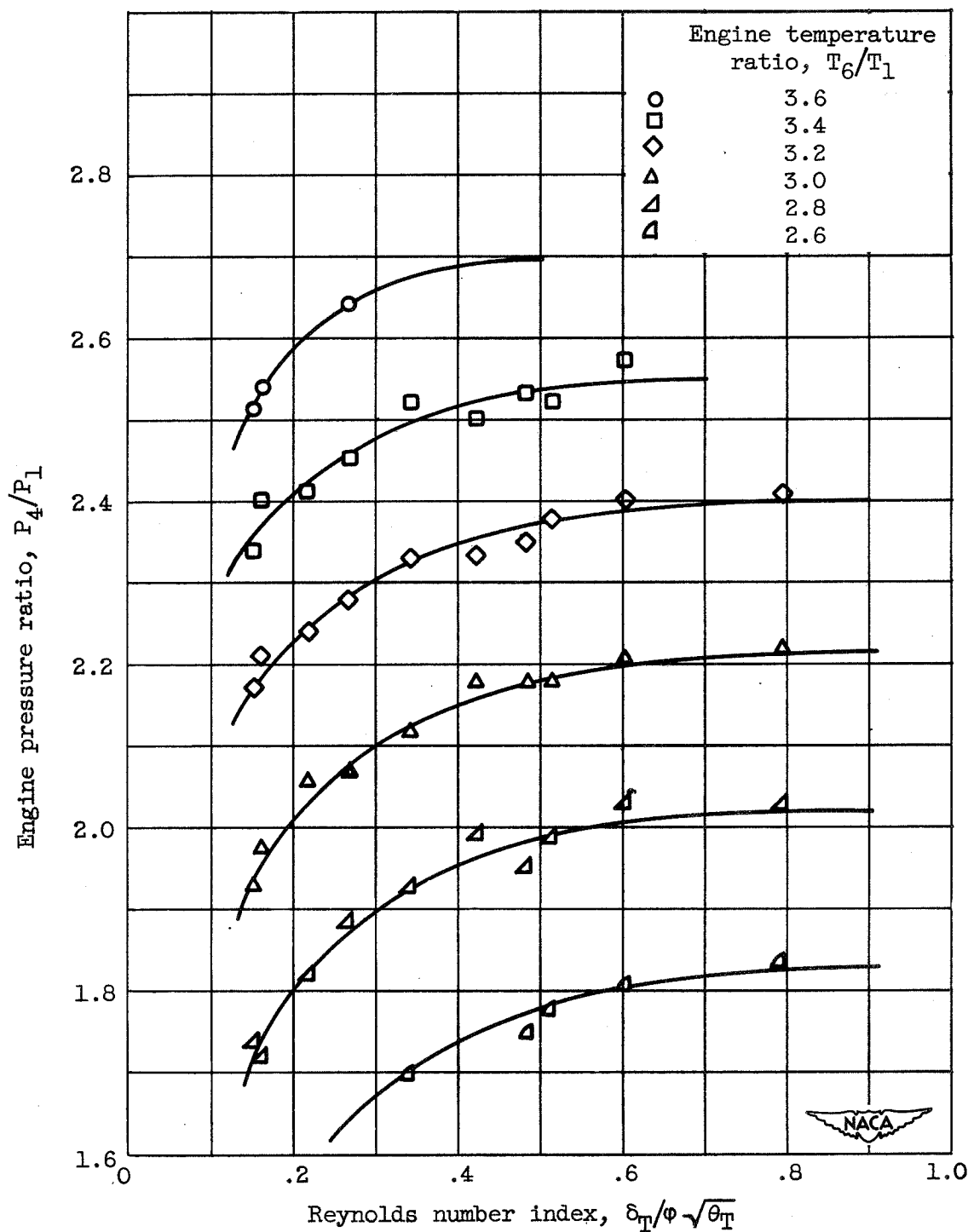
(c) Corrected engine speed, 6000 rpm.

Figure 11. - Continued.  Variation of engine pressure ratio with
Reynolds number index for various corrected engine speeds and
engine temperature ratios.
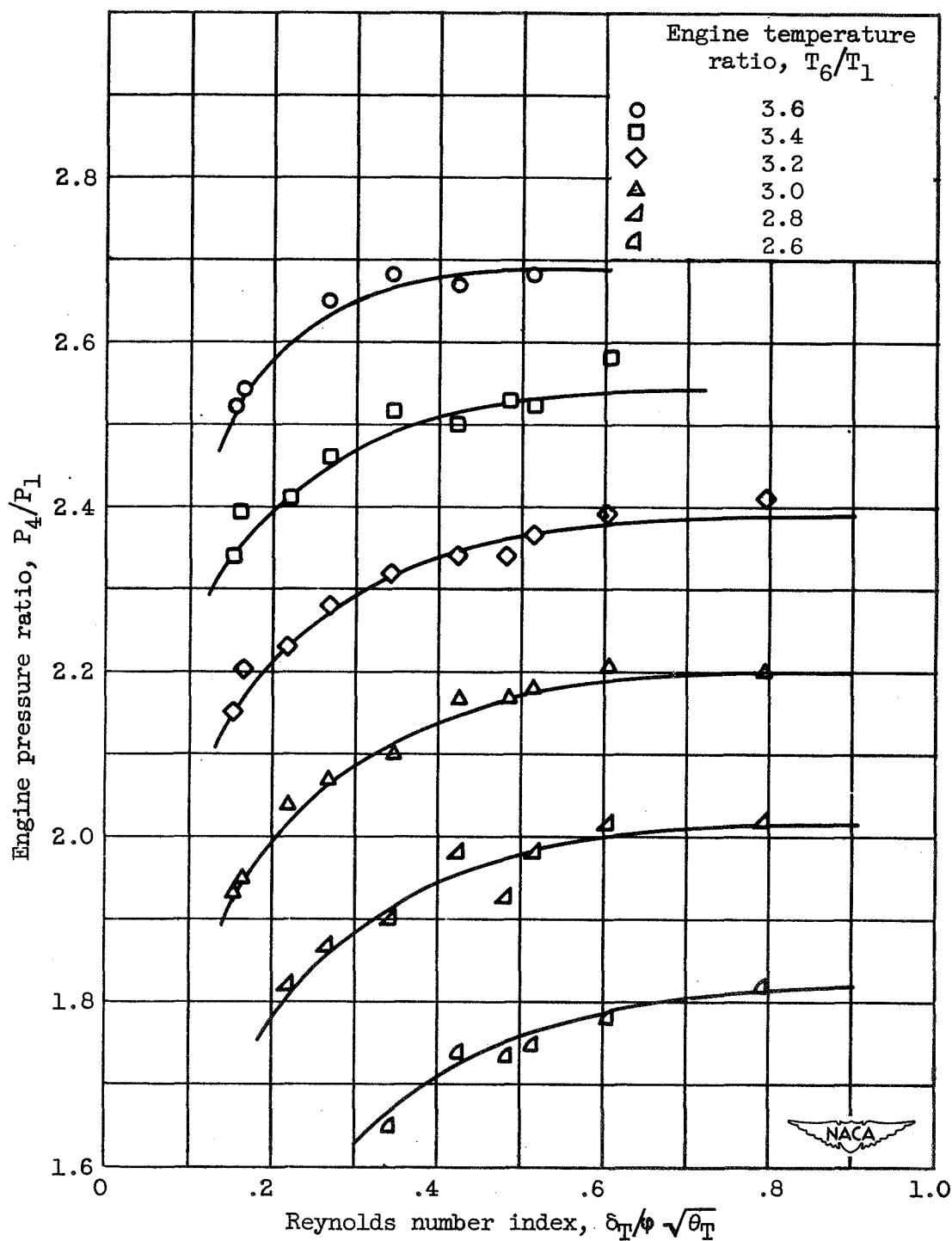
(d) Corrected engine speed, 6100 rpm.

Figure 11. - Continued. Variation of engine pressure ratio with Reynolds number index for various corrected engine speeds and engine temperature ratios.
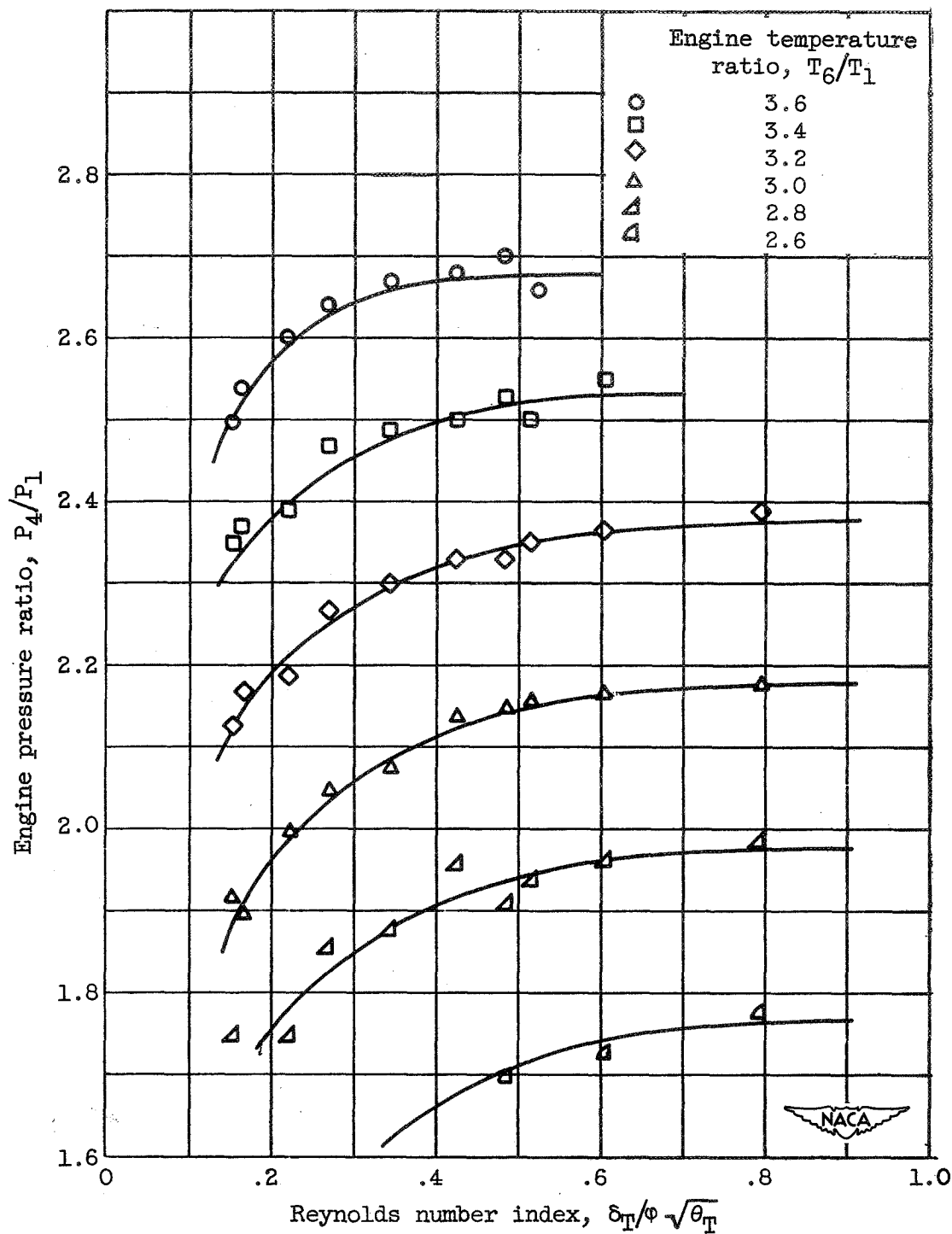
(e) Corrected engine speed, 6200 rpm.

Figure 11. - Continued.  Variation of engine pressure ratio with
Reynolds number index for various corrected engine speeds and
engine temperature ratios.
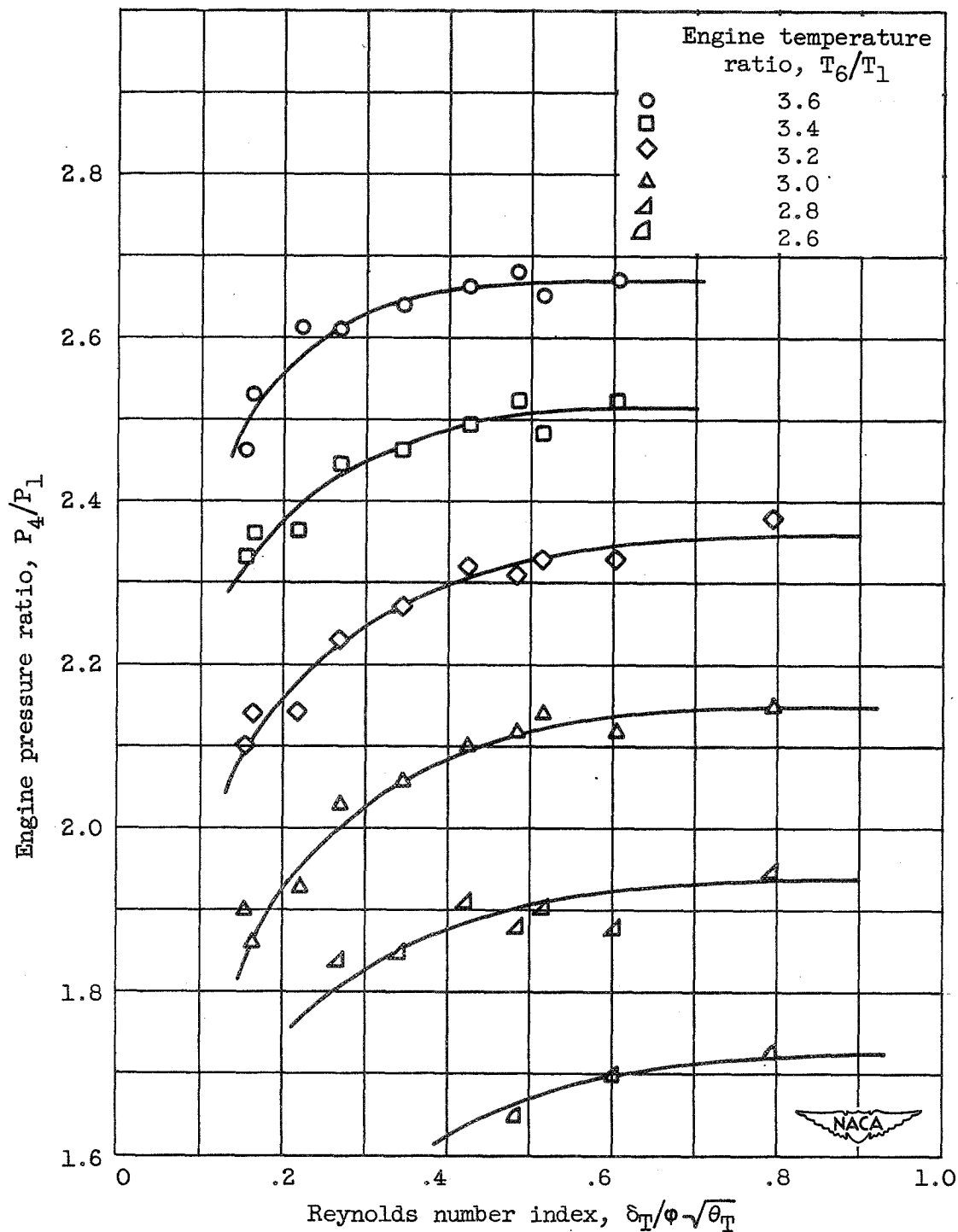
(f) Corrected engine speed, 6300 rpm.

Figure 11. - Concluded.  Variation of engine pressure ratio with
Reynolds number index for various corrected engine speeds and
engine temperature ratios.
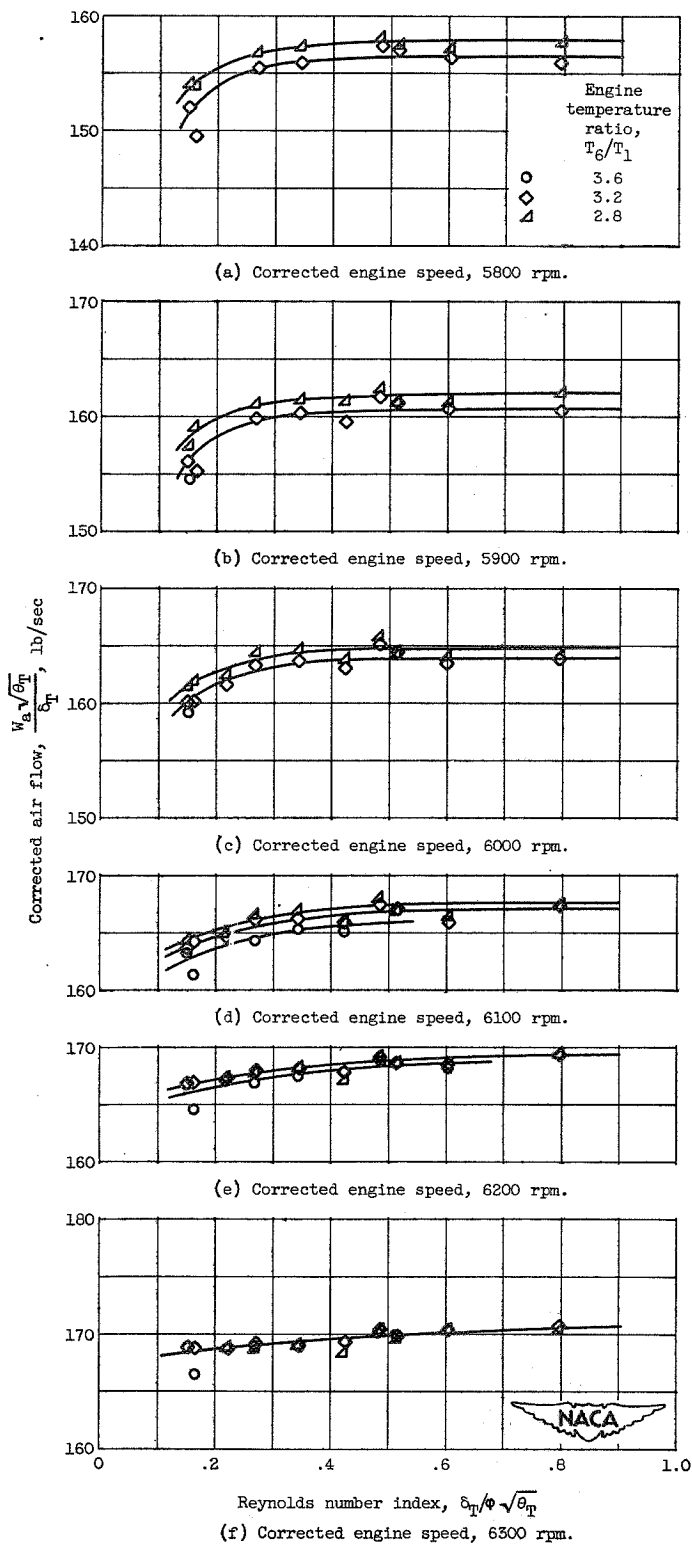
Figure 12. - Variation of corrected air flow with Reynolds number index for various corrected engine speeds and engine temperature ratios.

(a) Corrected engine speed, 5800 rpm.
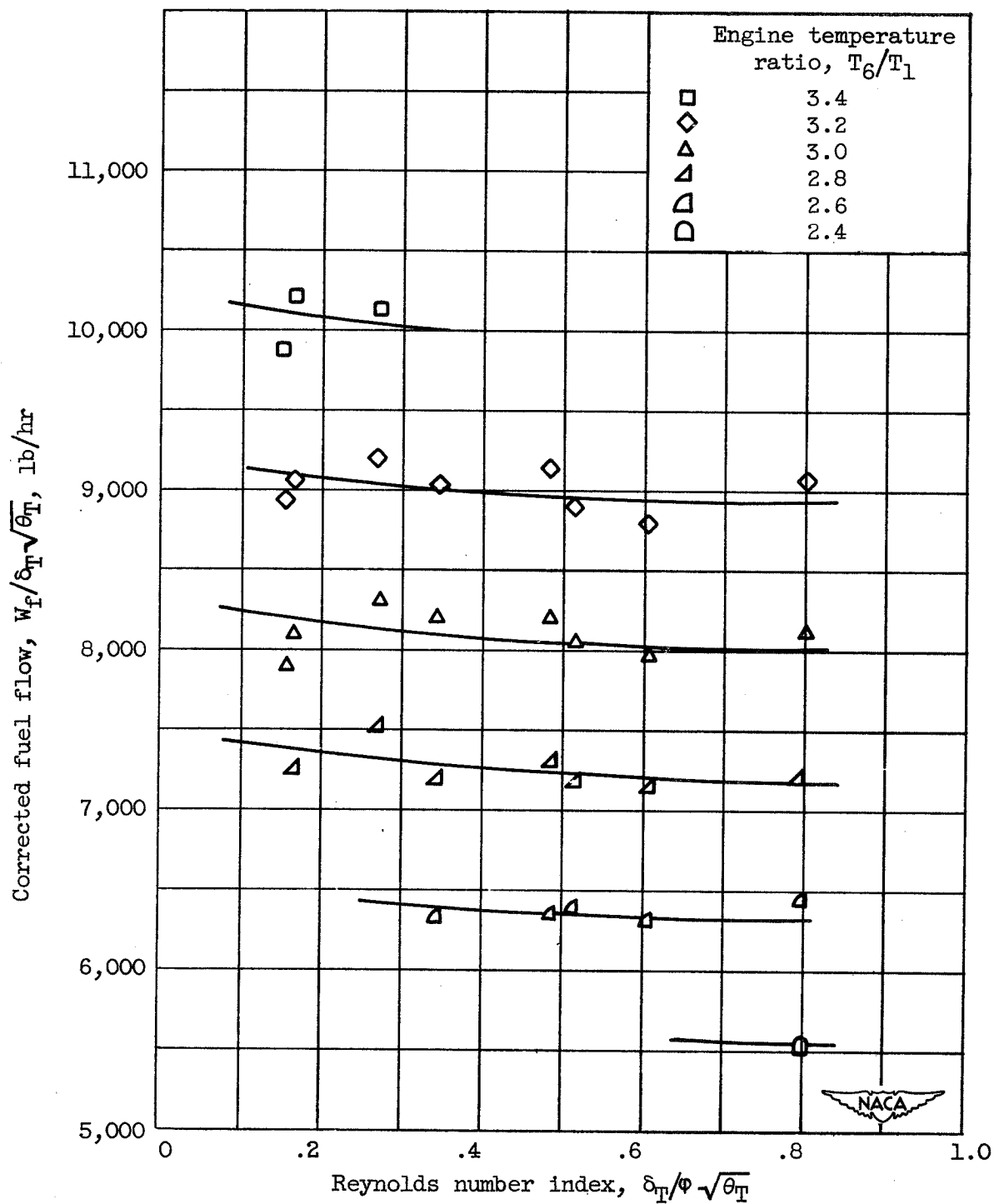
Figure 13. - Variation of corrected fuel flow with Reynolds number index for various corrected engine speeds and engine temperature ratios.

(b) Corrected engine speed, 5900 rpm.

Figure 13. - Continued.  Variation of corrected fuel flow with
Reynolds number index for various corrected engine speeds and
engine temperature ratios.

(c) Corrected engine speed, 6000 rpm.
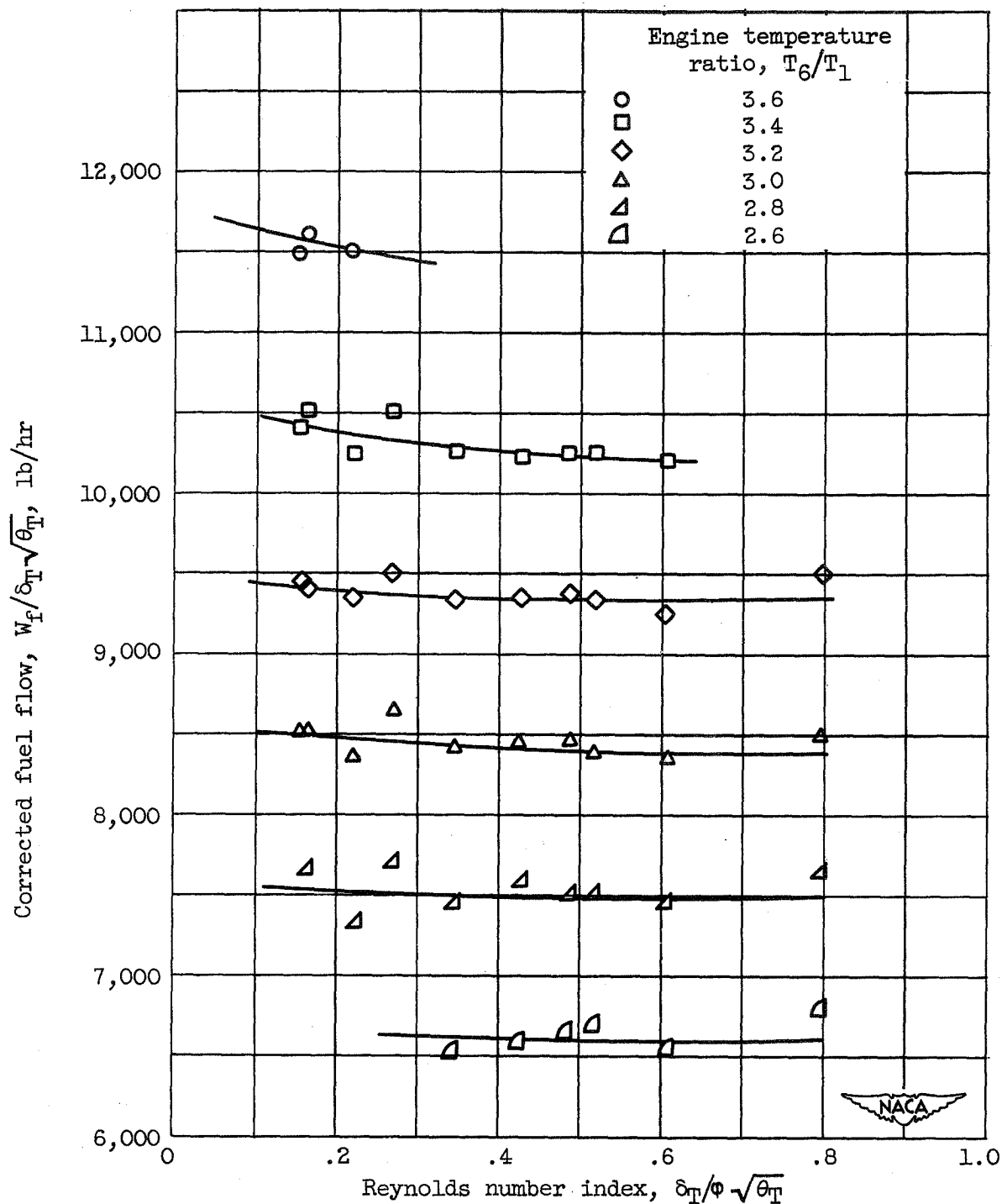
Figure 13. - Continued.　Variation of corrected fuel flow with Reynolds number index for various corrected engine speeds and engine temperature ratios.

(d) Corrected engine speed, 6100 rpm.

Figure 13. - Continued.  Variation of corrected fuel flow with
   Reynolds number index for various corrected engine speeds and
   engine temperature ratios.

(e) Corrected engine speed, 6200 rpm.

Figure 13. - Continued.  Variation of corrected fuel flow with
  Reynolds number index for various corrected engine speeds and
  engine temperature ratios.

(f) Corrected engine speed, 6300 rpm.

Figure 13. - Concluded.  Variation of corrected fuel flow with
Reynolds number index for various corrected engine speeds and
engine temperature ratios.
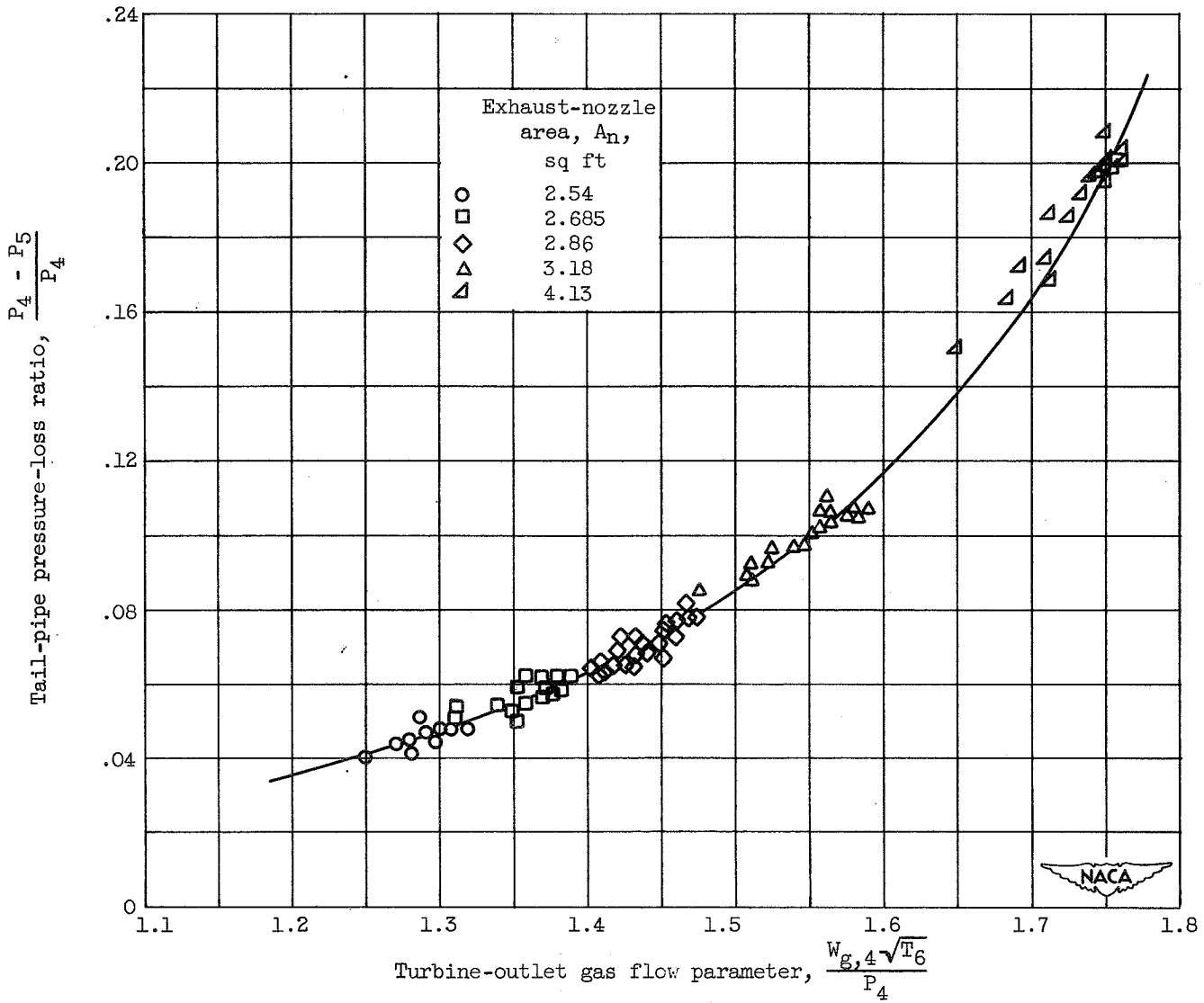
Figure 14. - Tail-pipe pressure loss.
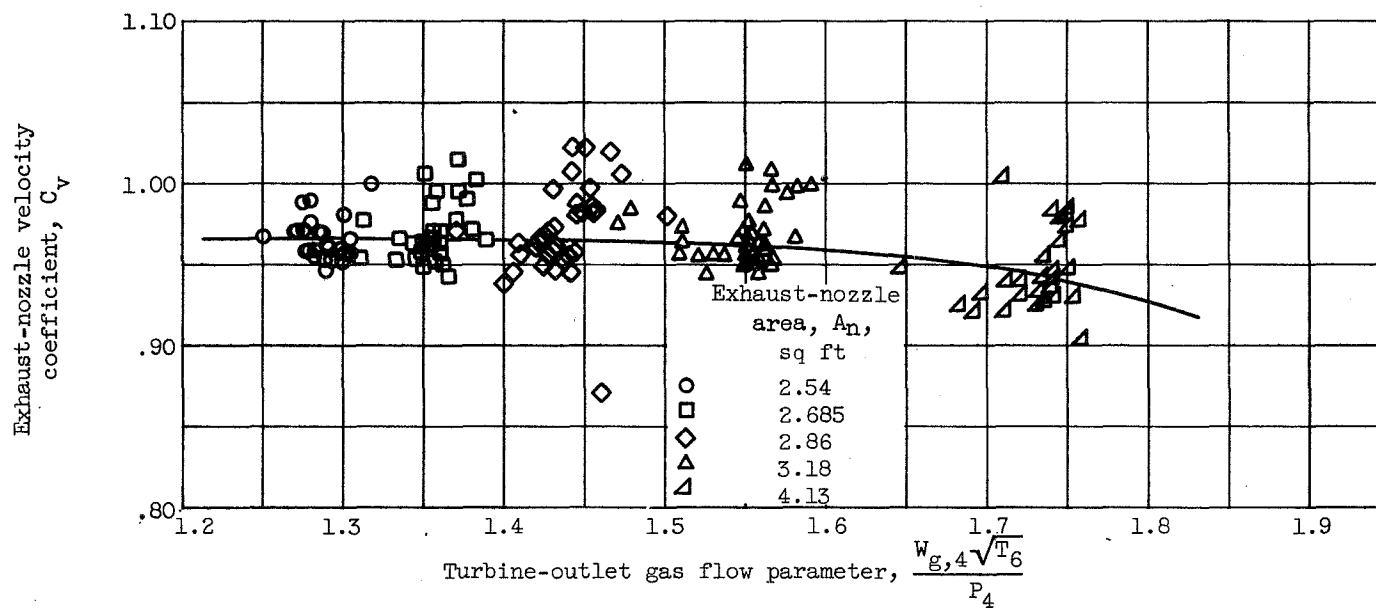
Figure 15. - Exhaust-nozzle velocity coefficient.
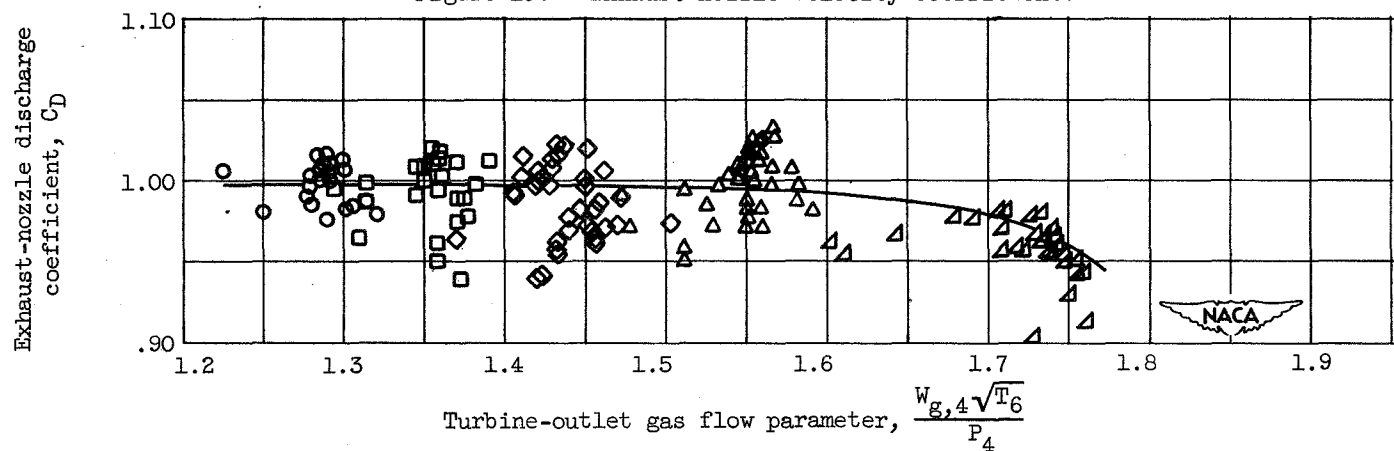


Figure 16. - Exhaust-nozzle discharge coefficient.

Exhaust-nozzle velocity coefficient, $C_v$

Exhaust-nozzle discharge coefficient, $C_D$

Turbine-outlet gas flow parameter, $\dfrac{W_{g,4}\sqrt{T_6}}{P_4}$

Exhaust-nozzle area, $A_n$, sq ft

○ 2.54
□ 2.685
◇ 2.86
△ 3.18
◁ 4.13
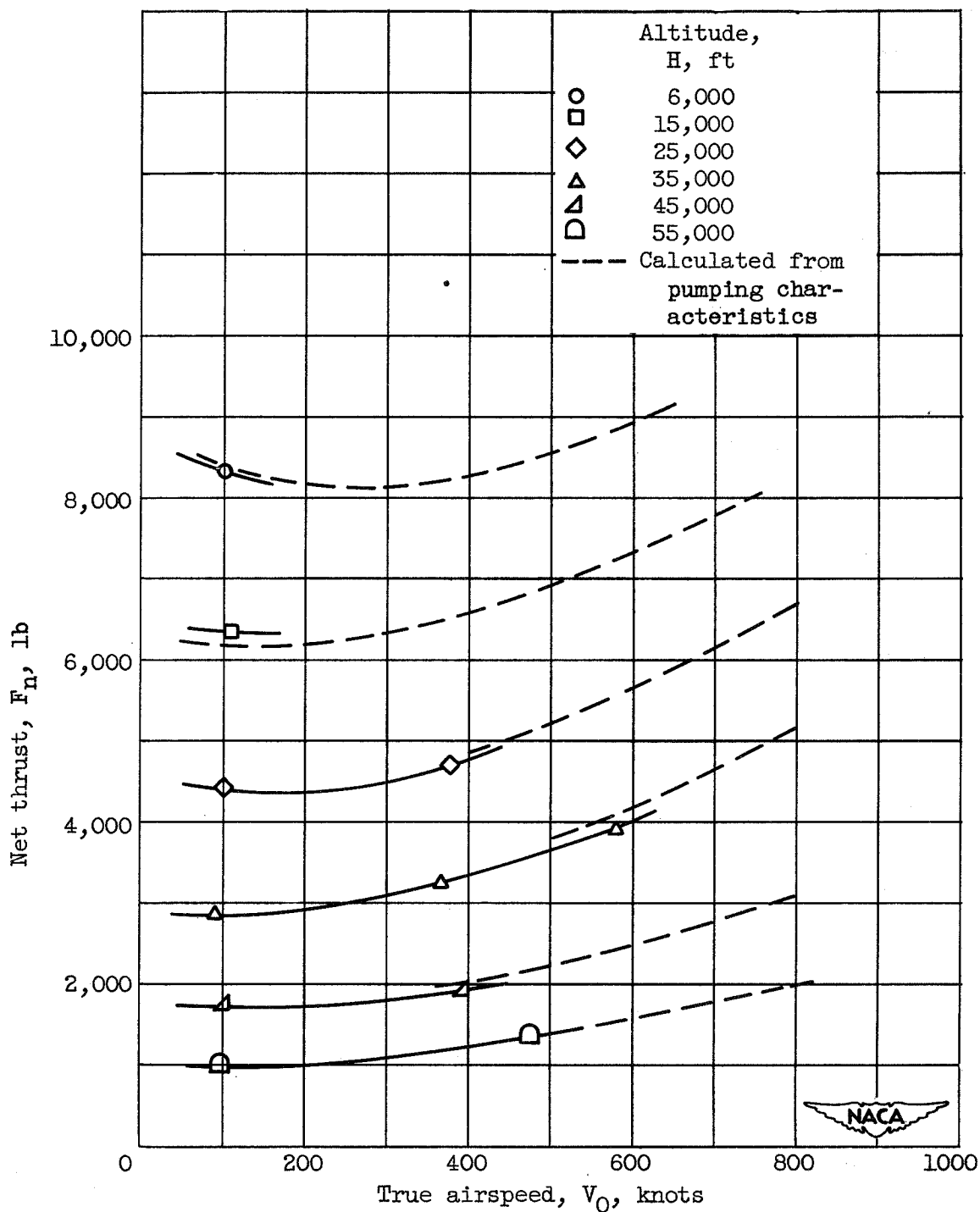
Figure 17. - Effect of true airspeed on net thrust at rated
   engine speed (6100 rpm) and rated turbine-outlet tempera-
   ture (1685° R).
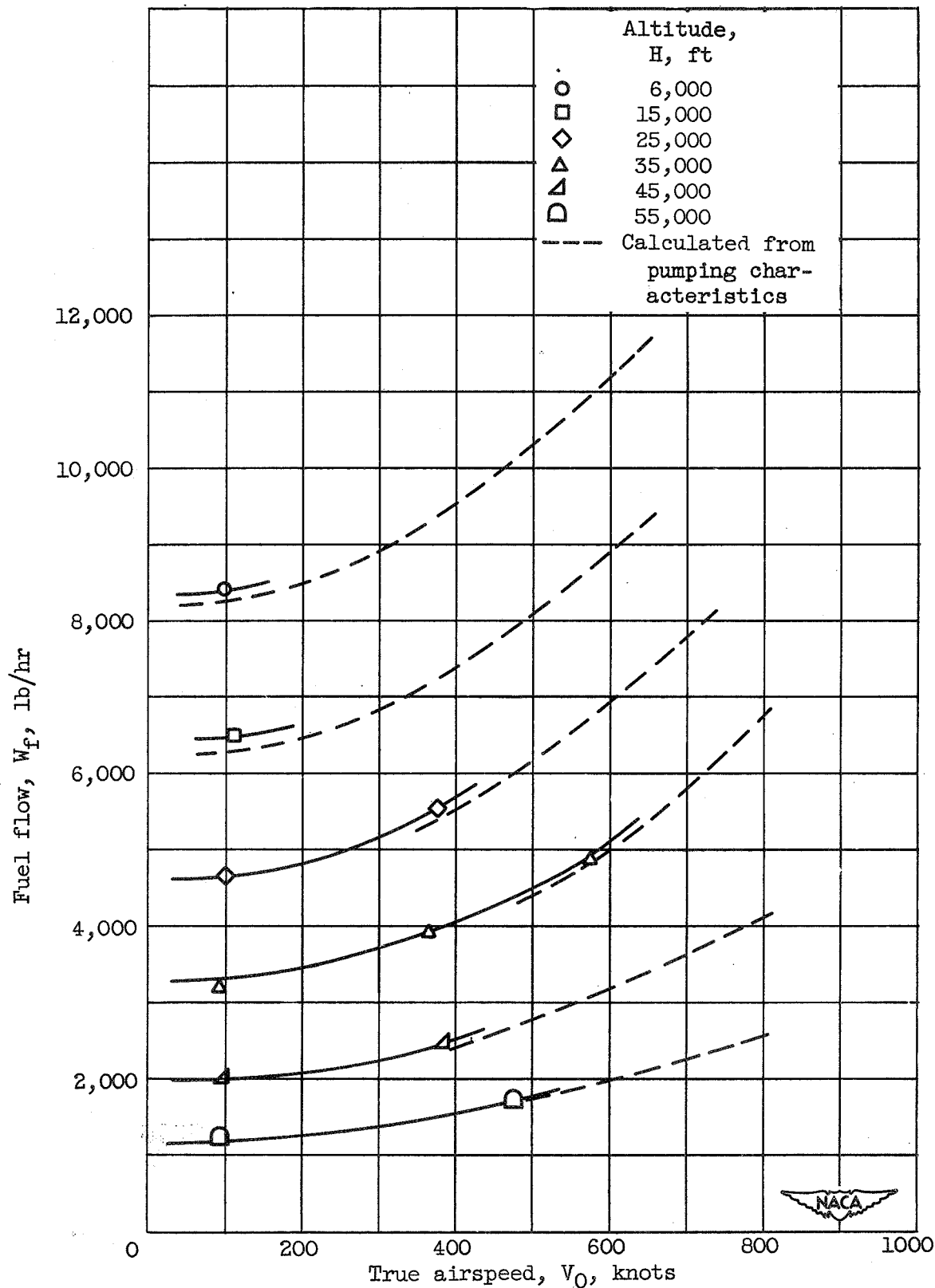
Figure 18. - Effect of true airspeed on fuel flow at rated
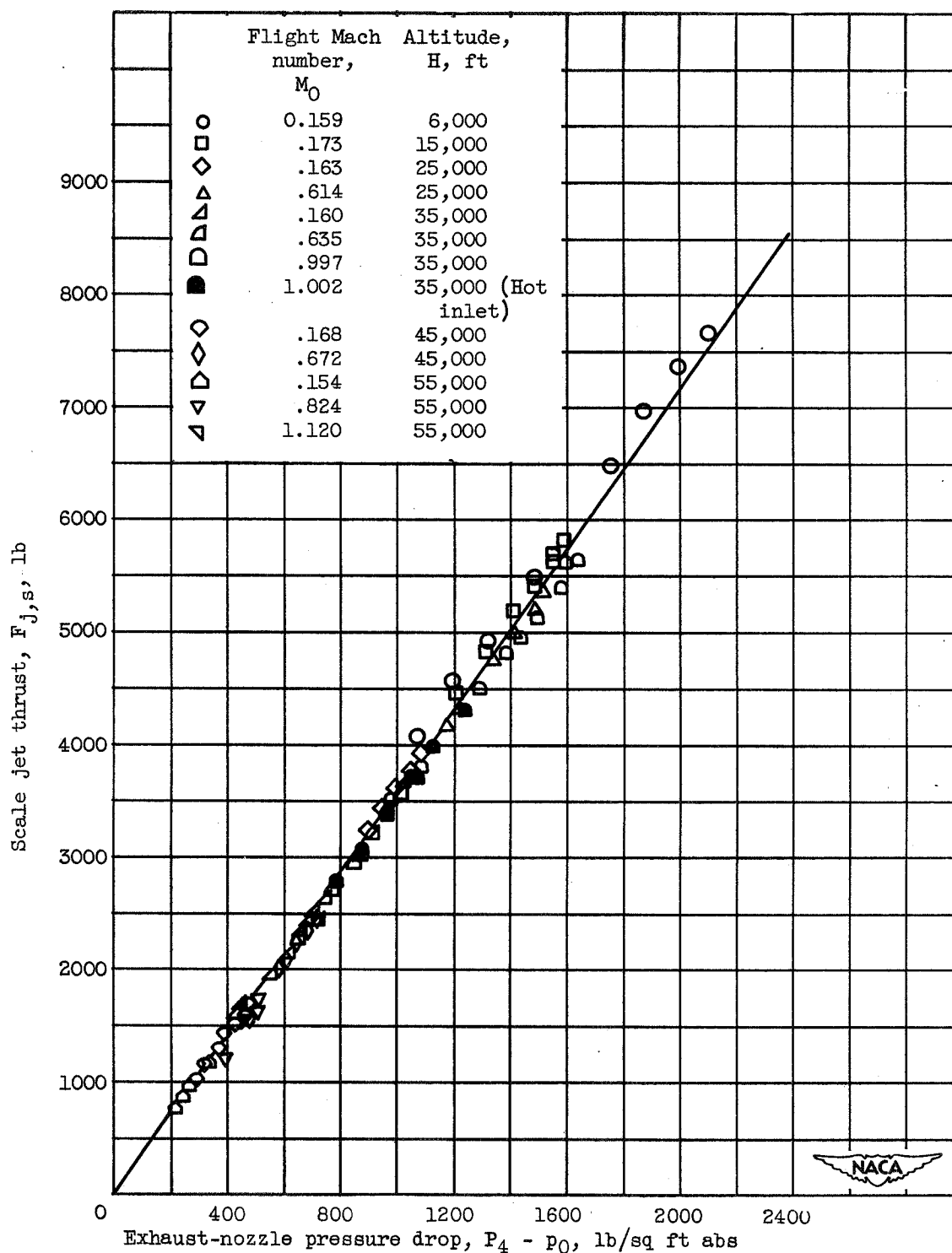engine speed (6100 rpm) and rated turbine-outlet temper-
ature (1685° R).        CONFIDENTIAL

| | Flight Mach number, $M_0$ | Altitude, H, ft |
|---|---|---|
| ○ | 0.159 | 6,000 |
| □ | .173 | 15,000 |
| ◇ | .163 | 25,000 |
| △ | .614 | 25,000 |
| ◁ | .160 | 35,000 |
| ▷ | .635 | 35,000 |
| ▽ | .997 | 35,000 |
| ● | 1.002 | 35,000 (Hot inlet) |
| ◇ | .168 | 45,000 |
| ◇ | .672 | 45,000 |
| △ | .154 | 55,000 |
| ▽ | .824 | 55,000 |
| ◁ | 1.120 | 55,000 |

(a) Exhaust-nozzle area, 2.54 square feet.
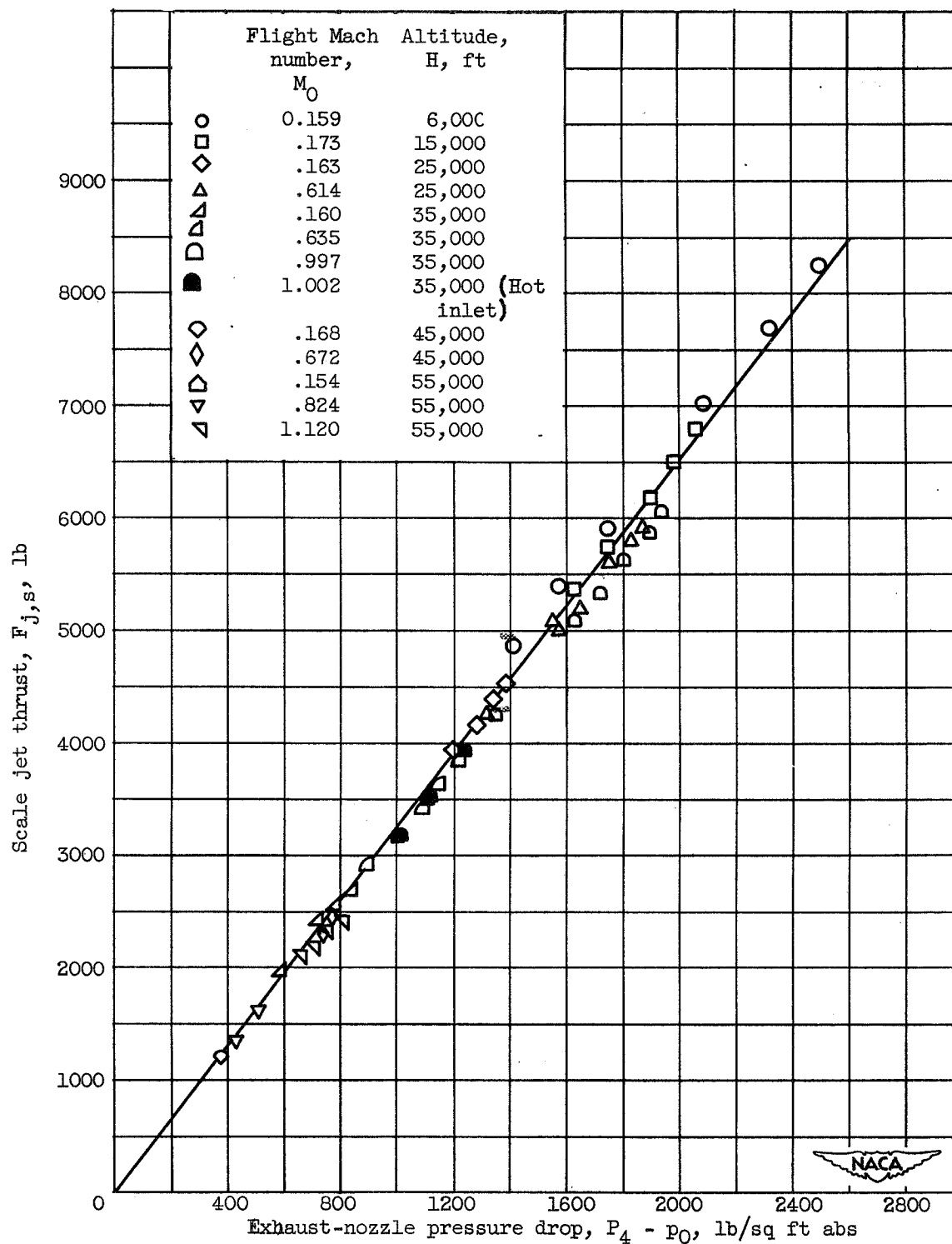
Figure 19. - Correlation of jet thrust with exhaust-nozzle pressure drop for a range of flight conditions.

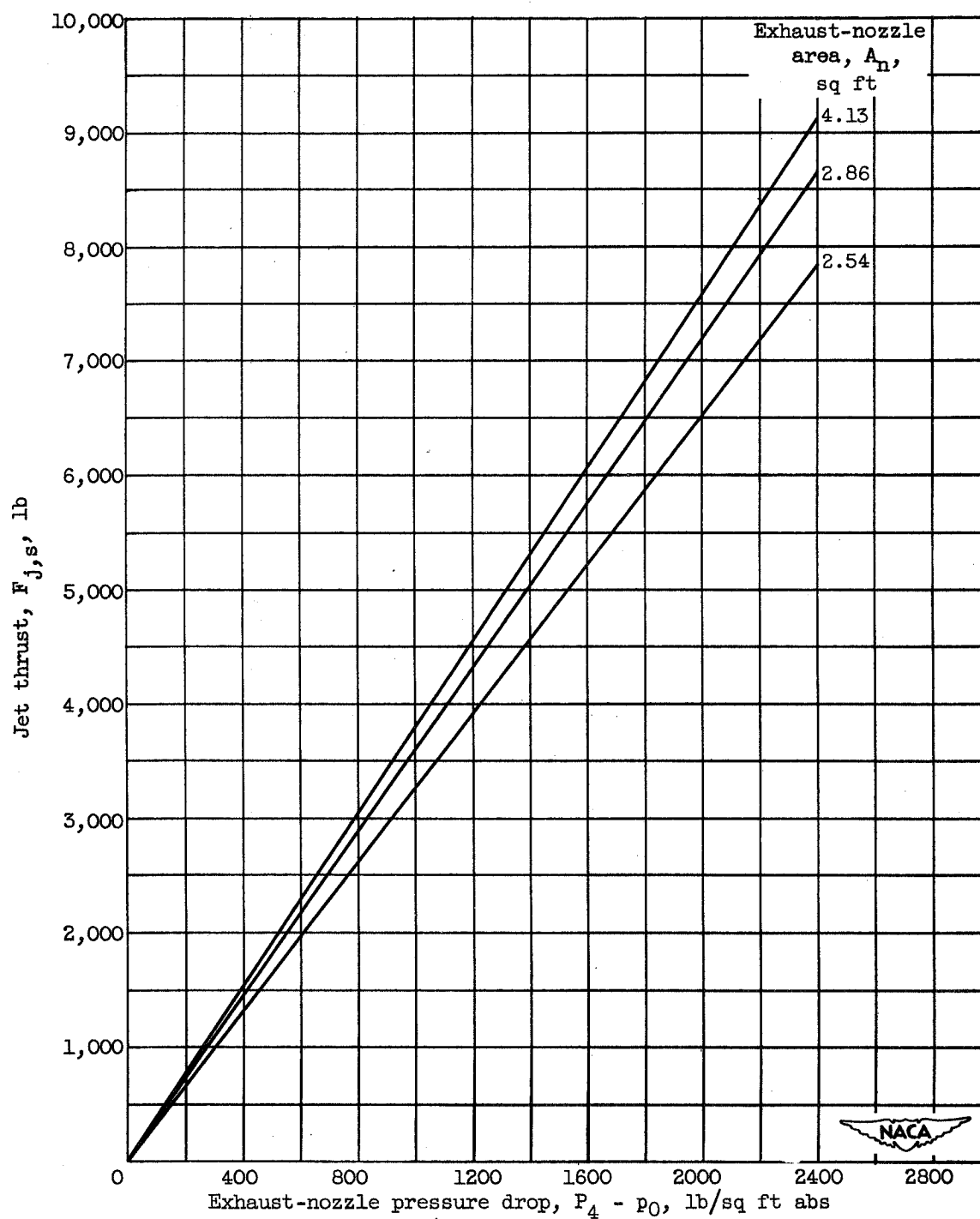| | Flight Mach number, $M_O$ | Altitude, H, ft |
|---|---|---|
| O | 0.159 | 6,000 |
| □ | .173 | 15,000 |
| ◇ | .163 | 25,000 |
| △ | .614 | 25,000 |
| ◁ | .160 | 35,000 |
| ◁ | .635 | 35,000 |
| ◠ | .997 | 35,000 |
| ● | 1.002 | 35,000 (Hot inlet) |
| ◇ | .168 | 45,000 |
| ◇ | .672 | 45,000 |
| ◠ | .154 | 55,000 |
| ▽ | .824 | 55,000 |
| ◁ | 1.120 | 55,000 |

(b) Exhaust-nozzle area, 2.86 square feet.

Figure 19. - Continued.  Correlation of jet thrust with exhaust-nozzle pressure drop for a range of flight conditions.
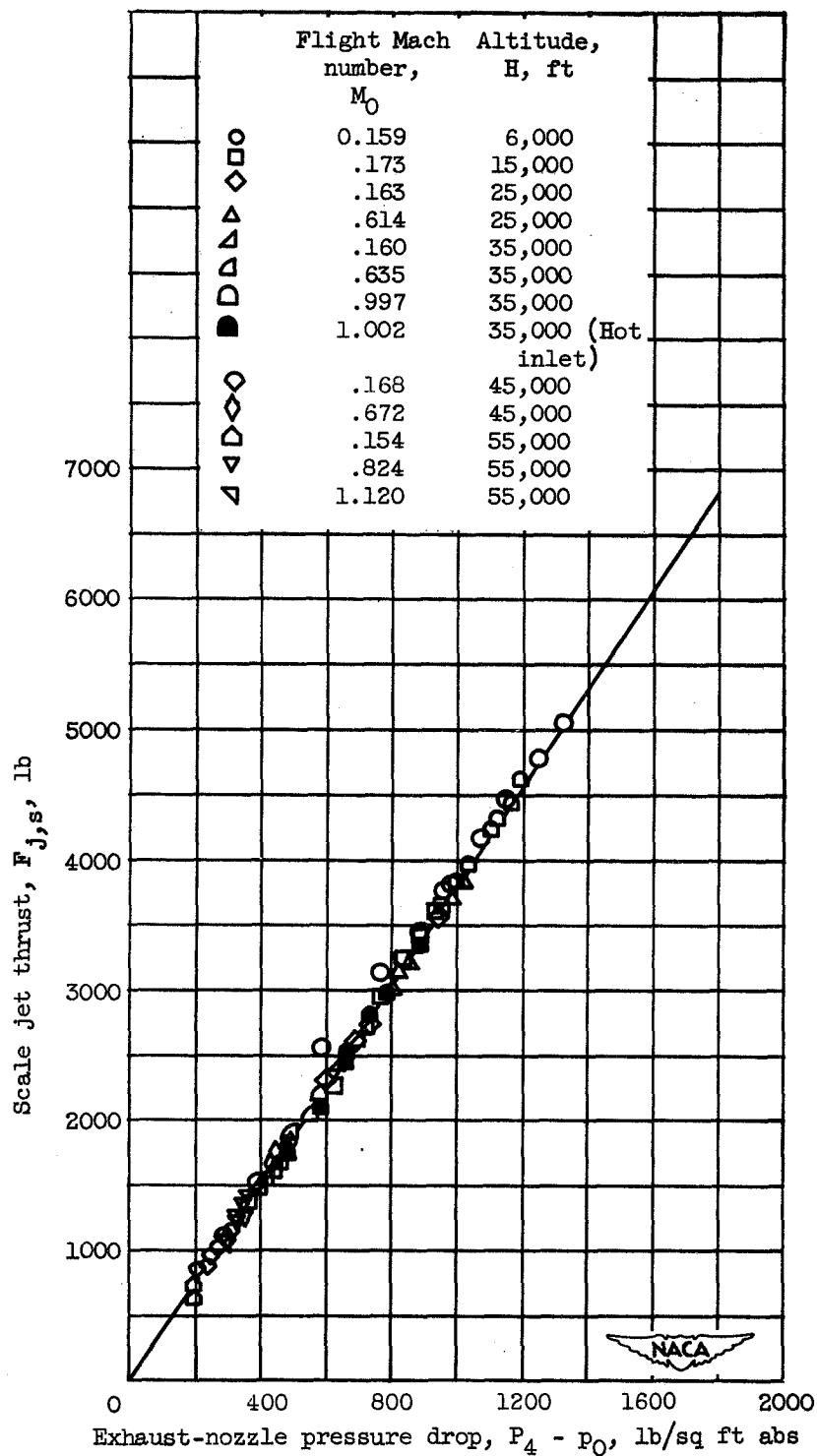
(c) Exhaust-nozzle area, 4.13 square feet.

Figure 19. - Concluded. Correlation of jet thrust
with exhaust-nozzle pressure drop for a range of
flight conditions.

Figure 20. - Correlation of jet thrust with exhaust-nozzle pressure drop for three exhaust-nozzle areas over range of altitudes from 6000 to 55,000 feet and flight Mach numbers from 0.154 to 1.120.
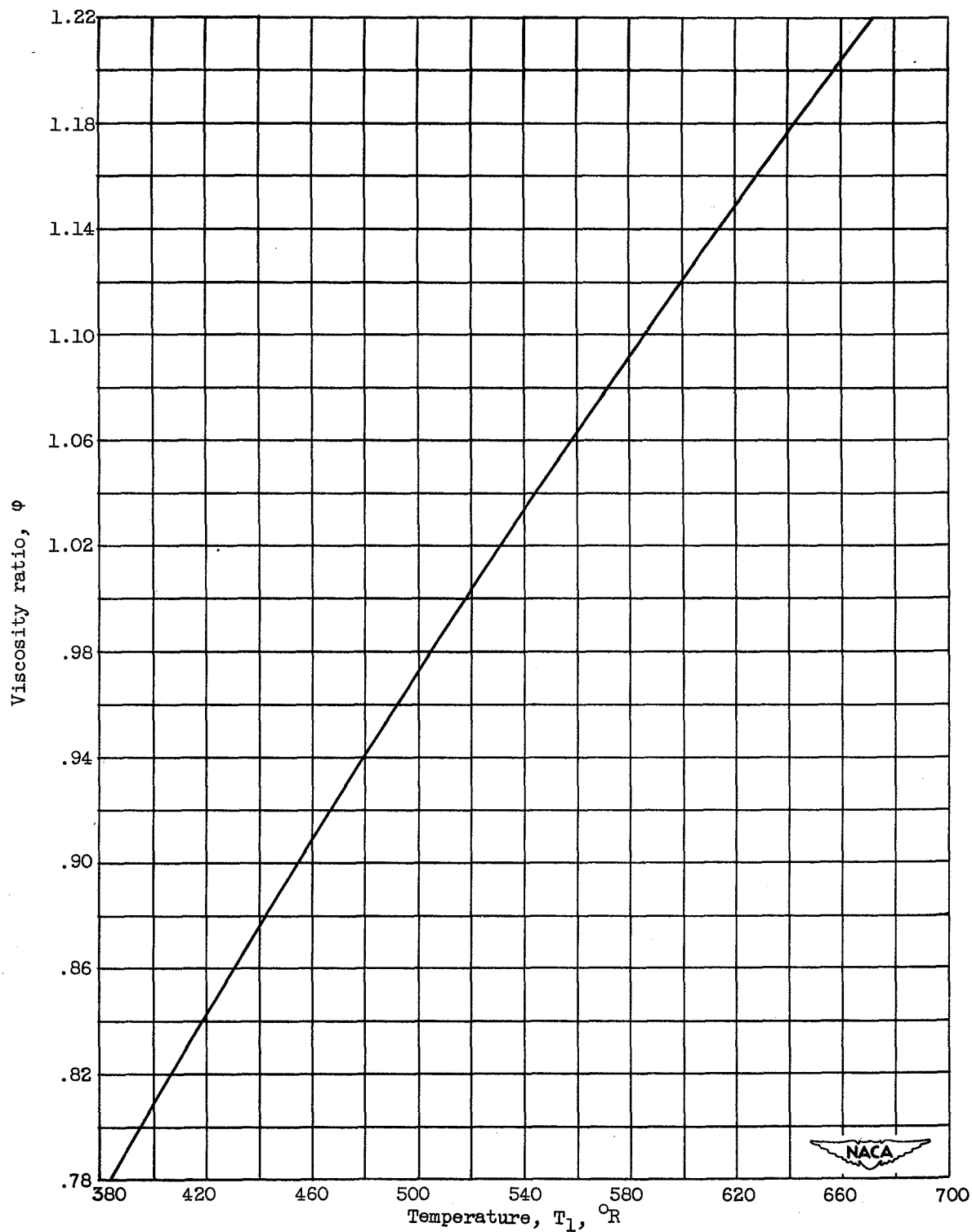
Figure 21. – Variation of viscosity ratio with temperature.

# NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

## RESEARCH MEMORANDUM

### ALTITUDE PERFORMANCE AND OPERATIONAL CHARACTERISTICS

### OF YJ71-A-7 TURBOJET ENGINE

*Ivan D. Smith*

Ivan D. Smith
Aeronautical Research Scientist
Propulsion Systems

*Charles V. Leonard, Jr.*

Charles V. Leonard, Jr.
Aeronautical Research Scientist
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*Harry E. Bloomer*

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Approved: *David S. Gabriel*

David S. Gabriel
Aeronautical Research Scientist
Propulsion Systems

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## Abstract

Altitude performance of a YJ71-A-7 turbojet engine, with afterburner inoperative, was determined in the NACA Lewis altitude wind tunnel over a wide range of flight conditions. Engine speed and exhaust-nozzle area were controlled independently during this investigation.

The variation of corrected values of air flow, net thrust, and fuel flow with corrected engine speed was not defined by a single curve with changes in altitude at given flight Mach number. Changes in altitude had very little effect on minimum specific fuel consumption at altitudes up to 45,000 feet. There is one exhaust-nozzle schedule that is nearly optimum for all flight conditions. Performance calculated from pumping characteristics agreed with experimental values and can therefore be used to extend engine performance data.